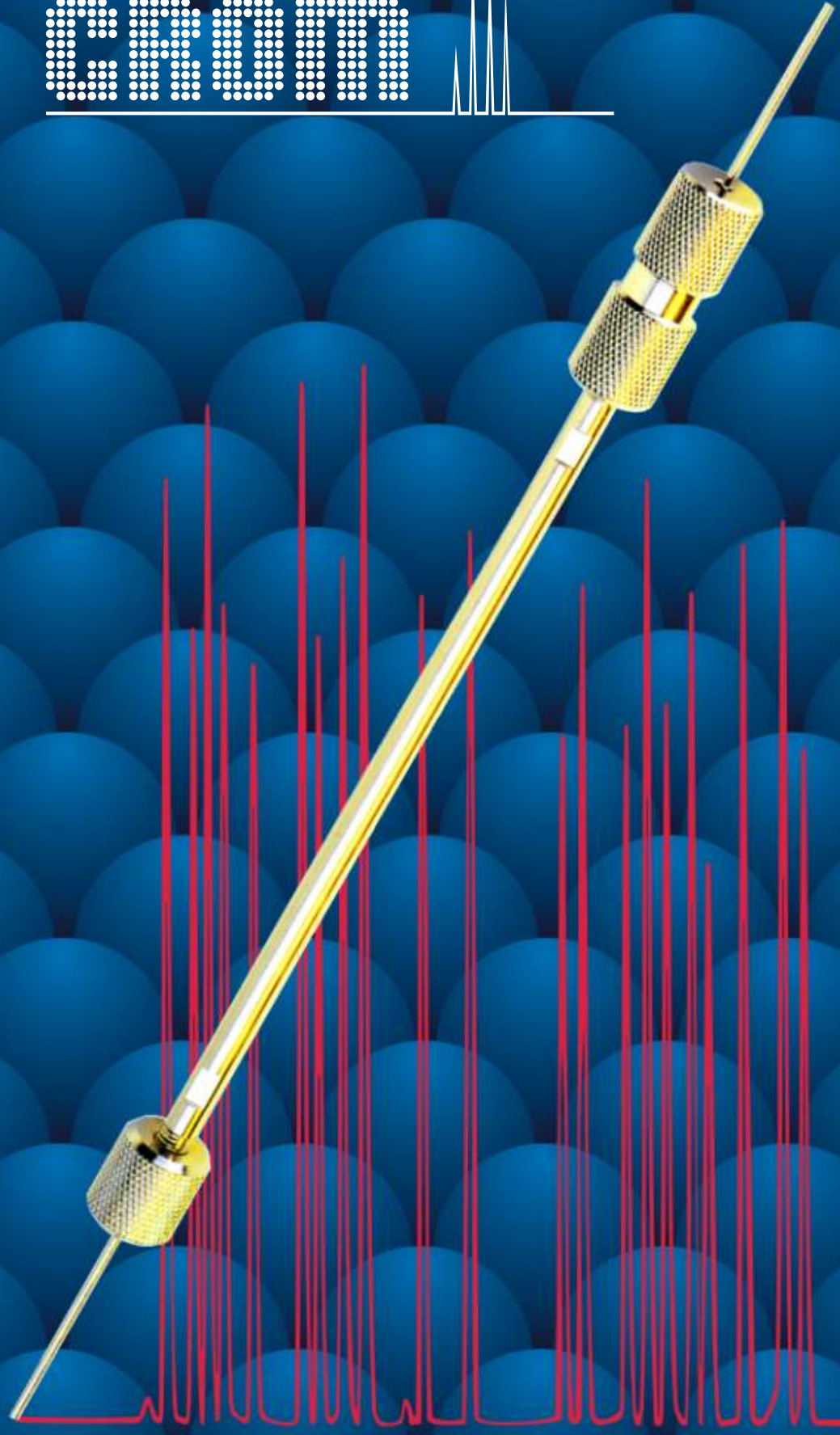
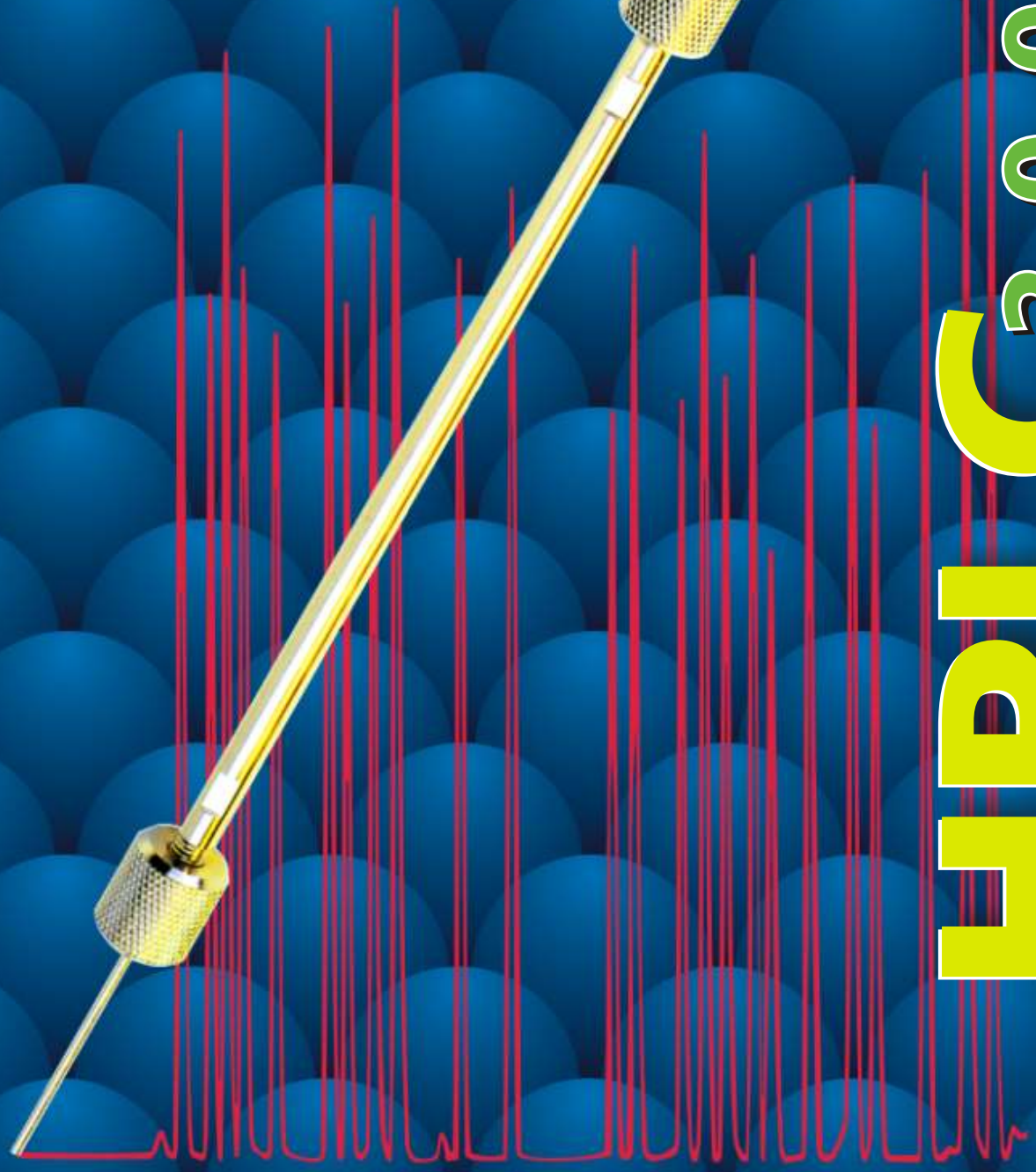


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GROM



HPLC 2000



# A Personal Note to Our Customers .....



## 1260

The marvellous, romantic city of Herrenberg was founded by the Duke of Württemberg in the Swabian mountains of southern Germany.

In 1983, our firm was founded by Mr. Michael Grom and established in the small city of Herrenberg. Then, in the summer of 1994, this enterprise was transformed into a corporation.

The goal of our enterprise is to provide products of the highest quality in order to support all of our customers in solving the problems they confront daily in their research and routine. Our intention, therefore, is always to offer you the newest, most innovative products. The scientific development of such products in our firm has been and still remains closely bound to university research.

An international network of qualified and competent dealers makes it possible for us to distribute our products worldwide. To ensure the effectiveness of our firm's pursuit of the highest quality standards, we have introduced two quality control systems:

Our laboratory consistently follows the recommendations of the "GLP" (Good Laboratory Practis) in all the analyses it does by contracts certified in 1993 by the Environmental Minister of Baden-Württemberg.

Moreover, our entire enterprise, i.e., from production, sales, and service to research and development, was certified in 1994 as being in conformity with the regulations set forth in the DIN-ISO-9001, respectively EN 29 001.

And in the future, we will strengthen even further our efforts towards quality and scientific innovation. Our scientific experts are always ready to give you the benefit of their experience if you should ever require advice. And whatever your needs might be, we especially look forward to working together with you.

## 1983

Since the founding of our firm in 1983, we have consistently made efforts in our "Refill-Service" for HPLC columns to fill your orders within 24-48 hours (for standard materials).

## 1985

We expanded our oft-proven **NovoGROM** Column System for preparative and analytical HPLCs to include microbore columns (1 and 2 mm i.d.; registered trademark).

## 1988

We obtained the patent rights for BIAx Columns. These are axially compressible, preparative HPLC columns constructed of steel (inner diameter from 8 to 100 mm, length up to 100 cm). In the same year, we also opened our scientific Laboratory for Analysis by Contract, which doubles as a laboratory for the development of new chromatographic methods.

## 1989

We were able, for the first time, to offer our own **GROM** Sil phase for high-resolution fluid chromatography in order to extend further and thereby complete the already broad palette of stationary phases produced by known manufacturers.

## 1990

We introduced the Capillary Zone Electrophoresis System we had developed in order to supplement then-current HPLC methods.

## 1993

We applied for a patent for our Capillary Column system for HPLCs (100 to 800 µm ID, with integrated guard columns).

## 1994

We substantially extended the palette of our own stationary **GROM** Sil phases for analytic and preparative HPLCs (cf. Tab. pages 12/13), and we now offer you, for the first time, our Column Sets for the rapid development of methods and for up-scaling in order to provide you with more efficient help in solving your separation problems.

## 1996

Unique, low-dispersion **NovoGROM** Microbore column hardware - 1.0 and 2.0 mm i.d. - has successfully been introduced.

## 1997

In order to promote further the most advanced analytical technique, i.e. Capillary Electrochromatography, we successfully introduced the **NovoGROM** capillary columns packed with outstanding stationary phases.

## 1998

Based on our experience and competence in High Speed HPLC, we have developed an unique, integrated, semipreparative- (8 mm i.d.) and preparative (20 mm i.d.) HPLC column hardware for fast separations in Combinatorial Chemistry.

## 1999

In order to meet the need of modern, advanced pharmaceutical and biochemical research chemically inert 94-, 384- and 1536-well deep-well **GROM** Microtiter Plates made from glass have been introduced.

## 2000

Capillary, Microbore and Analytical **NovoGROM** HPLC columns are available packed with novel, unique Zirconia-based 3 µm stationary phases. In addition to excellent resolution, these new packings offer extraordinary chemical (pH 1-14) and thermal (up to 200°C) stability.

## 2001

Two major decisions were made for investments to ensure the future and continued growth of GROM Analytik und HPLC and to be able to further convince customers through quality of service and innovation: the construction of our own, larger manufacturing, research and administrative building, as well as the extension of advertising activities and purchasing procedures to modern electronic media (such as email and internet).

## 2002

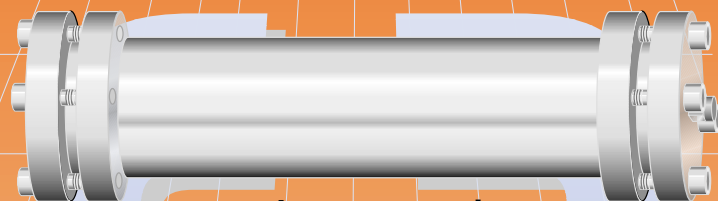
**GROM's** "websites" now include all product information not only in text and photo format, but also in an interactive **Applications Databank**, as well as in an interactive "Column Search Engine". These features ensure the rapid location of prices for and simplify the ordering of HPLC columns. Furthermore, September saw the move of the company headquarters to Rottenburg-Hailfingen

## 2003

For the first time, capillary columns are filled and sold with packings for SEC, IECX and HIC, especially for basic research in the "Life Sciences".

# Huge Variety of Dimensions

40-100 mm i.d.



preparative HPLC column

20 mm i.d.



semipreparative HPLC column

8 mm i.d.



semipreparative HPLC column

3.0, 4.0 and 4.6 mm i.d.



analytical HPLC column

1.0 and 2.0 mm i.d.



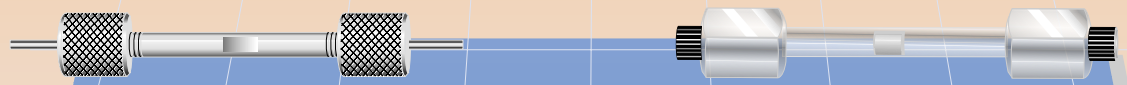
Microbore column

20 - 800  $\mu$ m i.d.



Capillary column

2.0 and 4.6 mm i.d.



High Speed column

300  $\mu$ m i.d.



Capillary High Speed column

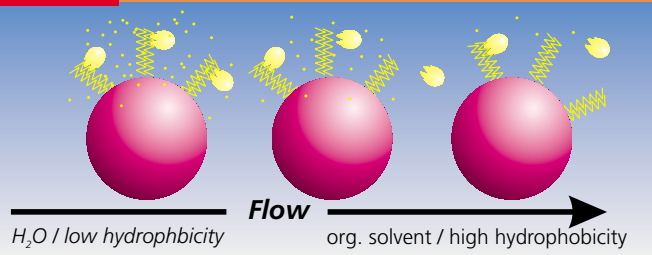
**Note!** Refill of microbore, analytical or preparative columns saves costs over the life of the hardware.

# Hugh Variety of Selectivity

## Reversed Phase Chromatography

### GROM-Sil Phases

(All commonly available packings from other manufacturers)

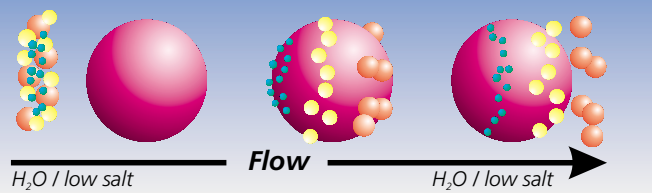


## Size Exclusion Chromatography

Novarose SE - 100/17

Toyopearl HW

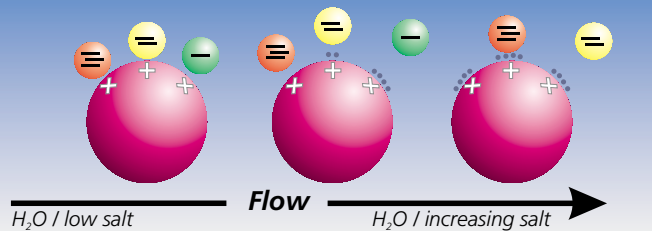
GROM Gel GPC



## Ion Exchange Chromatography

Toyopearl CM, -SP, -DEAE, ....

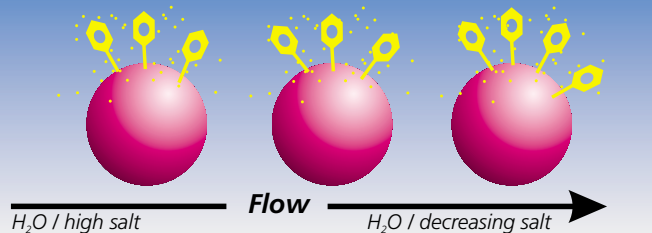
TSK-Gel SP-5PW, -DEAE-5PW



## Hydrophobic Interaction Chromatography

Toyopearl Ether, Butyl, Phenyl

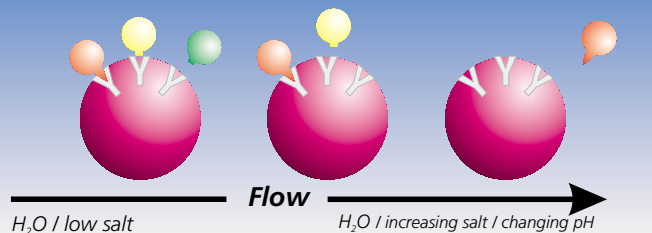
TSK-Gel Ether-5 PW, Phenyl-5 PW



## Affinity Chromatography

Novarose Act

Novarose IDA, TREN, DPA



# Comparison of the selectivity of

Laboratory experiments demonstrate time and again the wide disparity in retention behavior of superficially comparable ODS-silica phases and the same is true also for other coatings. Thus, in order to provide as wide a palette of selectivities as possible to enable the solution of even the most complex ....

## C18

### **GROM-SIL 100 ODS-0 AB**

High-quality phase with special endcapping for the outstanding separation of acids and bases.

### **GROM-SIL 100 ODS-1 PE**

Economical phase with partial endcapping and high selectivity.

### **GROM-SIL 100 ODS-2 FE**

Fully endcapped stationary phase with outstanding selectivity for most applications.

### **GROM-SIL 120 ODS-3 CP**

Encapsulated, chemically stable phase with metal-free silica gel matrix.

### **GROM-SIL 120 ODS-4 HE**

High resolution - a new hydrophilic end-capping makes this phase especially suitable for peptides.

### **GROM-SIL 120 ODS-5 ST**

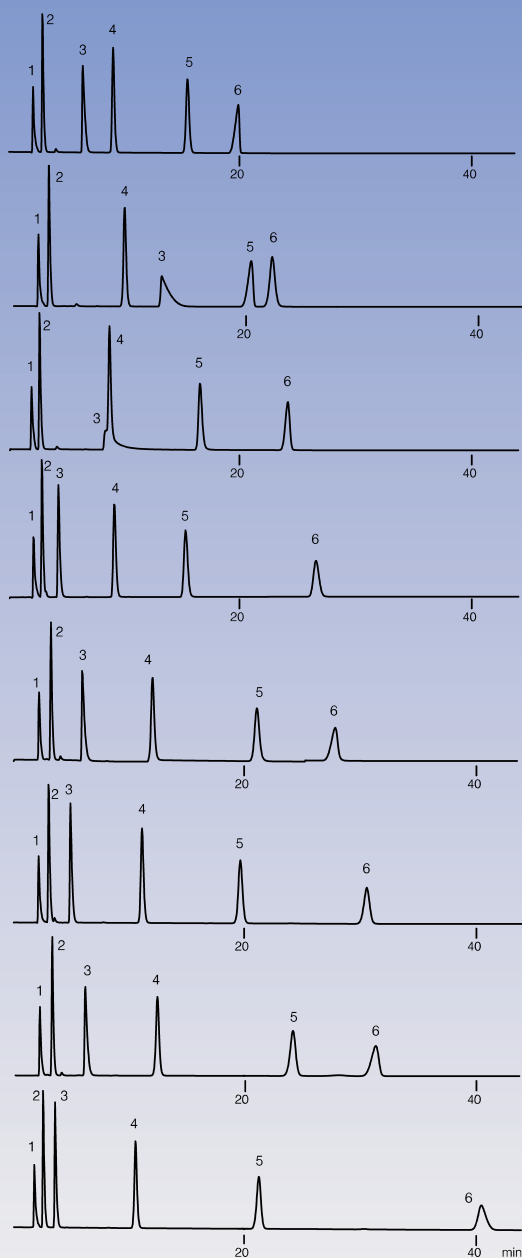
Standard phase for practically all applications.

### **GROM-SIL 120 ODS-6 NE**

ODS phase for special applications. High hydrophobicity despite the absence of endcapping.

### **GROM-SIL 80 ODS-7 pH**

Polymer-coated, pH-stable phase with extremely high carbon-content.

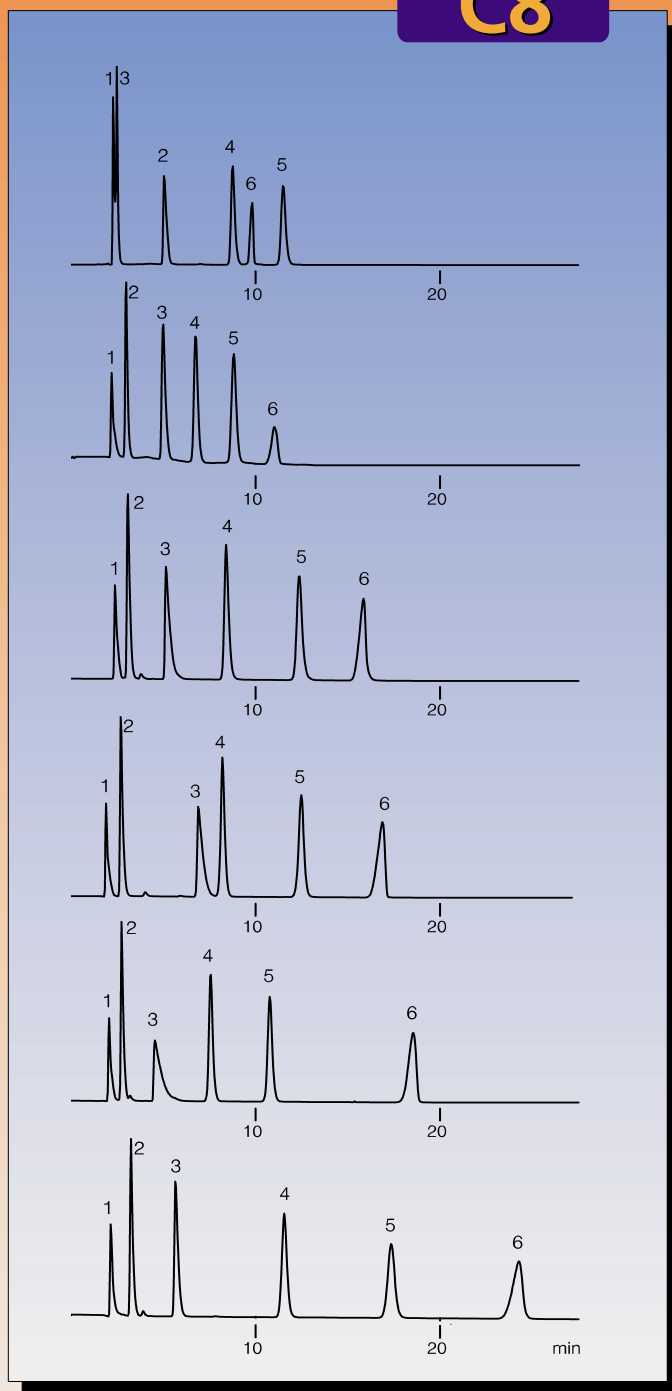


# GROM SIL C18- and C8-phases

the most complex analytical problems by HPLC, eight different **GROM** SIL ODS-phases and six different **GROM** SIL octyl phases have been developed. Chromatograms of a test mixture (modified test of T. Daldrup and B. Kardel, Chromatographia 18, 81-83, 1984) run under identical

conditions demonstrate the different hydrophobicity, and thus the selectivity, of the various differently prepared stationary phases. This is exemplified by the differing retention times of toluene and in particular of the basic components.

## C8



### Test chromatograms: "extended Daldrup test"

**Column:** NovoGrom 250 mm x 4.0 mm id.  
**Flow rate:** 1.0 ml/min  
**Eluent:** Na-phosphate buffer, 50 mM, pH 2.3 / acetonitrile = 58 / 42 + 420 ml acetonitrile  
**Detection (UV):** 230 nm

### GROM-SIL 100 Octyl-1 B

Base-deactivated phase with enhanced selectivity.

### GROM-SIL 100 Octyl-2 AB

Acid- and base-deactivated phase specially suitable for the separation of acids and bases.

### GROM-SIL 120 Octyl-3 BA

Tailor-made for the separation of basic molecules, monomeric bonding of alkyl silanes with differing chain lengths.

### GROM-SIL 120 Octyl-4 FE

Fully endcapped octyl phase, "monomerically bound" and thus highly versatile.

### GROM-SIL 120 Octyl-5 CP

Octyl-phase on silicone-encapsulated particles, particularly long lived.

### GROM-SIL 120 Octyl-6 MB

Densely coated C8 phase, endcapped, for acidic and basic compounds.

### Compounds injected:

- |                          |   |
|--------------------------|---|
| 1) uracil                | 4) 5-(p-methylphenyl)-5-phenylhydantoin |
| 2) 4-hydroxybenzoic acid | 5) diazepam                             |
| 3) diphenylhydramine     | 6) toluene                              |

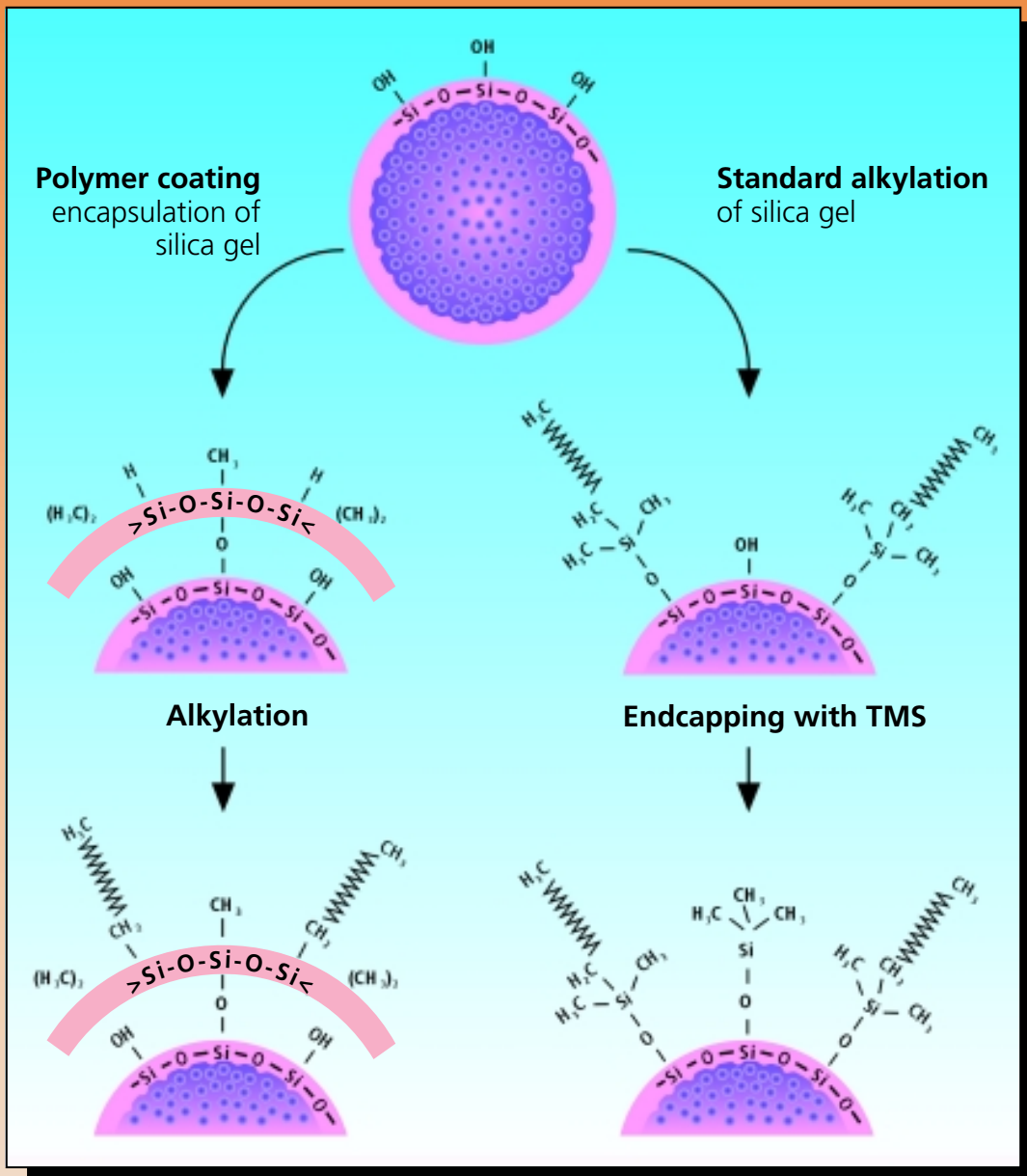
# Overview of GROM SIL phases

	Stationary Phase	Particle Size $\mu\text{m}$								prep. mat- erial	spheri- cal	poly- end- cap- ped	bond- ing	Pore Diameter $\text{\AA}$
		1.5	2	3	4	5	7	10						
<b>C18</b>	GROM-SIL ... ODS-0 AB (acid/base deactivated)	x		x		x		x		x	x		100	
	GROM-SIL ... ODS-1 PE (partially endcapped)			x		x		x		x	x		80, 100	
	GROM-SIL ... ODS-2 FE (fully endcapped)	x		x		x		x		x	x		80, 100, 300	
	GROM-SIL ... ODS-3 CP (encapsulated)			x		x	x	x	x	x		x	120, 300	
	GROM-SIL ... ODS-4 HE (hydrophilic endcapping)			x	x	x	x	x	x	x	x		120, 200	
	GROM-SIL ... ODS-5 ST (standard)			x	x	x	x	x	x	x	x		60, 120, 200, 300	
	GROM-SIL ... ODS-6 NE (non endcapped)			x		x							120	
	GROM-SIL ... ODS-7 pH (pH-stable)				x							x	80	
	GROM Sapphire C18			x		x		x	x	x	x		65, 110	
	GROM Ruby C18		x							x	x	x	110	
<b>C8</b>	GROM-SIL ... Octyl-1 B (base deactivated)			x		x				x	x		100	
	GROM-SIL ... Octyl-2 AB (acid/base deactivated)			x		x				x	x		100	
	GROM-SIL ... Octyl-3 BA (for bases)			x		x				x	x		120	
	GROM-SIL ... Octyl-4 FE (fully endcapped)			x	x	x		x	x	x	x		80, 100, 300	
	GROM-SIL ... Octyl-5 CP (encapsulated)			x	x	x	x	x	x	x		x	120, 300	
	GROM-SIL ... Octyl-6 MB (monomer binding)			x		x		x	x	x	x		120, 200, 300	
	GROM Sapphire C8			x		x		x	x	x	x		65, 110	
GROM Ruby C8		x							x	x	x	110		
<b>C6</b>	GROM-SIL ... Hexyl-1 MB (monomeric bonding)					x			x	x	x		80, 100	
	GROM-SIL ... Phenyl-1 FE (fully endcapped)			x		x		x	x	x	x		120, 300	
	GROM-SIL ... Phenyl-2 CP (encapsulated)					x						x	120, 300	
	GROM-SIL ... Phenyl-3 PE (partially endcapped)			x		x		x	x	x	x		80, 100	
<b>C4</b>	GROM-SIL ... Butyl-1 ST (standard)			x		x			x	x			120, 300	
	GROM-SIL ... Butyl-2 FE (fully endcapped)			x		x			x	x			300	
	GROM Sapphire C4			x		x		x	x	x	x		65, 110	
<b>C1</b>	GROM-SIL ... TMS-1 ST (standard)			x		x			x	x	x		120, 300	
	GROM-SIL ... TMS-2 CP (encapsulated)			x		x			x	x		x	120, 300	
<b>CN</b>	GROM-SIL ...Cyan-1 ST (standard)			x		x				x	x		120, 300	
	GROM-SIL ...Cyan-2 PR (cyanopropyl)			x		x				x	x		80, 100	
	GROM-SIL ...Cyan-3 CP (encapsulated)					x				x		x	120	
<b>NH<sub>2</sub></b>	GROM-SIL ...Amino-1 PR (NH <sub>2</sub> -propyl)			x		x		x		x	x		80, 100	
	GROM-SIL ...Amino-2 PA (cross linked Poly- NH <sub>2</sub> )					x				x		x	120	
	GROM-SIL ...Amino-3 CP (encapsulated NH <sub>2</sub> -residues)					x			x		x		80	
	GROM-SIL ...Amino-4 PR (propylamine bonded to silica)			x			x		x				300	
<b>Diol</b>	GROM-SIL ...Diol					x		x	x	x		60, 120, 200, 300		
<b>Si</b>	GROM-SIL ...Normal Phase-1 ST (standard silica)			x		x		x	x	x			80, 100, ... 1000	
	GROM-SIL ...Normal Phase-2 SP (spherical silica)			x		x		x	x	x			60, 120, 200,...1000	
	GROM-SIL ...Normal Phase-3 PV (polyvinylalcohol)					x				x	x		120	
	GROM-Sapphire			x		x		x	x	x			65, 110	
<b>IEX</b>	GROM-SIL ...SEC (size exclusion chromatography)					x		x	x	x			60, 120, 200, 300	
	GROM-SIL ...StrongAnion-1,					x		x		x			80, 100	
	GROM-SIL ...Weak Anion-2(ion exchange)						x			x			300	
	GROM-SIL ...StrongCation-1 (ion exchange)					x		x		x			80, 100	
	GROM-SIL ...Weak Cation-2(ion exchange)						x			x			300	
	GROM-SIL ...HIC (hydrophobic interaction chrom.)						x			x			300	

## Chiral Stationary Phases for Pharmacology, Medicine and

Surface Area m <sup>2</sup> /g	Pore Volume ml/g	% C	Recommended pH of Mobile Phase	Field of Applications	Abbreviation for the order number
200	0.5	11	2 - 8	fat-soluble Vitamins, .....	GS OD 0.....
220, 200	0.5, 0.5	7, 6	2 - 8	Drugs: Antibiotics, Anti-	GS OD 1.....
220, 200, 100	0.5, 0.78, 1	12, 11, 6	2 - 8	histamines, Barbiturates	GS OD 2.....
320, 170	0.8, 0.7	15, 6	1 - 10	etc. ... , Herbicides, Fungi-	GS OD 3.....
300, 200	1.0, 0.95	16, 11	2 - 8	cides, Bacteriocides,	GS OD 4.....
580, 300, 200, 150	1.1, 1.0, 0.95, 0.7	22, 17, 12, 7	2 - 8	Pesticides ..., Nucleotides,	GS OD 5.....
300	1.0	17	2 - 8	Catecholamines, .....	GS OD 6.....
510	1.0	22	1 - 10	Peptides, Proteins, .....	GS OD 7.....
500, 270	0.9, 1.1	23, 16	1.5 - 9		GS OD S.....
130	0.3	11	1.5 - 9		GS OD R.....
200	0.5	6.5	2 - 8	Peptides, Proteins, Nucleo-	GS OC 1.....
200	0.5	5	2 - 8	tides, basic compounds,	GS OC 2.....
300	1.0	9	2 - 8	(Amines, etc.), Fatty acids	GS OC 3.....
220, 200, 100	0.5, 0.5, 0.78	6.6, 6, 3	2 - 8	(phenacyl derivatives),	GS OC 4.....
320, 170	0.8, 0.7	10, 5.5	1 - 10	Angiotensins, drugs .....	GS OC 5.....
300, 200, 150	1, 0.95, 0.7	10, 7, 4	2 - 8	Antihistamines, .....	GS OC 6.....
500, 270	0.9, 1.1	15, 10	1.5 - 9		GS OC S.....
130	0.3	7	1.5 - 9		GS OC R.....
220, 200	0.5, 0.5	4, 4	2 - 8	Vitamins, Bile acids, ....	GS HE 1.....
				Polyphenols, .....	
300, 150	1.0, 0.7	9, 5	2 - 8		GS PH 1.....
320, 170	0.8, 0.7	7, 4	1.5 - 9		GS PH 2.....
220, 200	0.5, 0.5	6.6, 6	2 - 8		GS PH 3.....
300, 150	1.0, 0.7	7, 2.5	2 - 8	Proteins, Catechins, .....	GS BU 1.....
100	1.0	1,5	2 - 8	Vitamins, .....	GS BU 2.....
500, 270	0.9, 0.9	10.5, 7	1.5 - 9		GS BU S.....
300, 150	1.0, 0.7	4	2 - 8	SFC, H <sub>2</sub> O-sol. Vitamins, ...	GS TM 1.....
320, 170	0.8, 0.7	3	1.5 - 8	Analgesics, ... Phenols, .....	GS TM 2.....
300, 150	1.0, 0.7	4.8	2 - 8	Steroids, Antidepressives,	GS CN 1.....
220, 200	0.5, 0.5	3.5	2 - 8	Polyphenols, Alkaloids,	GS CN 2.....
320	0.8	4	1,5 - 8	SFC, .....	GS CN 3.....
220, 200	0,5	2	2 - 8	Mono-, Oligosaccharides,	GS NH 1.....
300	1.0		2 - 8	(Analysis of beverages),	GS NH 2.....
420	1.1		1.5 - 9	H <sub>2</sub> O-soluble Vitamins,	GS NH 3.....
100	0.78		2 - 8	Additives, Steroids, .....	GS NH 4.....
580, 300, 200, 150	1.1, 1.0, 0.95, 0.7		2 - 8		GS OH 1.....
220, 200, ...	0.5, 0.5, ..., 1.25		2 - 8	Vitamins, Cortisone,	GS NP 1.....
580, 300, 200, ...	1.1, 1.0, 0.95, ...		2 - 8	SFC ....., Drugs,	GS NP 2.....
300	1.0		2 - 8	Lipids, Steroids, Purines,	GS NP 3.....
				Aflatoxins,	
500, 270	0.9, 1.1		2 - 8	tricyclic Antidepressives,	GS NP S.....
580, 300, 200, 150	1.1, 1.0, 0.95, 0.7		2 - 8	Peptides, Glycoproteins,	GS SE 1.....
220, 200	0.5, 0.5		2 - 8	Nucleosides, Nucleotides,	GS SA 1.....
100	0.7		2 - 8	Nucleic acids (DNAs,	GS WA 1.....
220, 200	0.5, 0.5		2 - 8	RNAs), Polysaccharides, etc. ,	GS SC 1.....
100	0.7		2 - 8		GS WC 1.....
100	0.7		2 - 8		GS HI 1.....

Biochemistry see pages 69 to 82 and 151

Alkylation of *GROM-SIL* reversed phases

In addition to the standard alkylation techniques, silica gels for reversed phase HPLC may be prepared by the more recently developed, alternative method of "polymer encapsulation". Here, *GROM-SIL* particles are coated with a reactive polymeric silicone film which binds chemically to the surface of the silica gel. This chemically bound film is then alkylated. The spherical

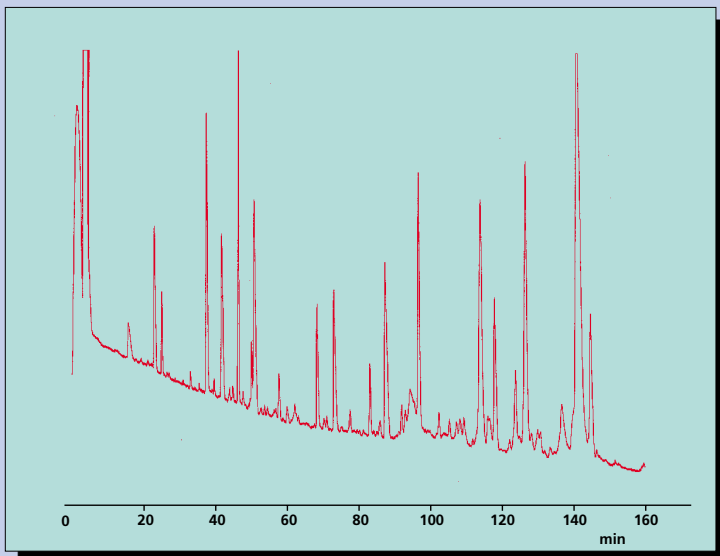
encapsulated silica particles possess the same mechanical strength as non-coated particles. In the case of the polymer encapsulated phases, the alkyl moieties are bound to silicon atoms in the polymer film rather than directly via Si-O-Si alkyl bonding to the silica surface. This leads to a considerable increase in chemical stability.

# List of Applications - analysed samples -

	Page		Page
<b>A</b>		<b>M</b>	
Additives in foodstuffs	36	Metal chelates	26
Aflatoxins	32	<b>N</b>	
Aldehydes	29, 31	Neuroleptics	28
Alkaloids	25, 35, 40	Nonylphenoxylates (non-ionic detergents)	31
Alcohols	19, 21, 31, 51, 52	Nucleosides	23, 26
Alkylbenzenes	7, 17	Nucleotides	25, 30, 40, 46
Amino acids	27, 28, 53 - 67	<b>O</b>	
Analgesics / antipyretics (Thomapyrin)	28, 45	Oligosaccharides	19 - 21, 34, 39, 50
Angiotensins (peptide hormones)	24, 30, 31, 41	Organic acids	17, 19, 20, 24, 50, 51
Anions	16	Organochlorides	32
Antiarrhythmics	38	Organophosphates	32
Antibiotics	25, 28, 36, 37	<b>P</b>	
Antidepressives (tricyclic)	37	Peptides	16, 23, 30, 31, 44, 46
Antihistamines	38	Pesticides	32, 38, 47
Antirheumatics	28	Phenols	48
Aryl acids	33	Poly (A) - nucleotides	25
Aspartame	29	Polyamines	58, 59
Atenolol ( $\beta$ -blocker)	32	Polyaromatic hydrocarbons (PAH's)	49
<b>B</b>		Polymer analysis	26, 29
Barbiturates	25	Polyphenols	32, 33, 37
Benzoates	6, 7, 18, 46	Preservatives	32, 45
Benzodiazepines	28, 7, 45	Propranolol	32, 45
Bile acids	37	Proteins	23, 30, 36, 41, 42
Bitter acids (in beer)	51	Purines	23
Biogenic amines	58, 59	Pyrimidines	23
Beta-blockers	23, 45, 57	<b>Q</b>	
Bradykinins	38	Quinones	35
<b>C</b>		<b>R</b>	
Carbohydrates	19 - 21, 34, 39, 50	Retinoids	34
Cardioglycosides	33	Rose oil essence	31
Catecholamines	27, 28	Rubicine	27
Cold-cures	25, 33	<b>S</b>	
Corticosteroids	33, 34	Saccharides	19 - 21, 34, 39, 51
Cyclodextrins	26	Saikosides	35
Cytostatics	27	Spasmolytics	35
<b>D</b>		Steroids	33, 34, 39
Detergents	39	Sulfonamides	37
Dyes	23	Sweetening agents	29, 32
<b>E</b>		<b>T</b>	
Explosives (trinitrotoluenes)	32, 40	Triazines	28
<b>F</b>		Tocopherols	13, 19
Fatty acids	35	Tryptic digest	16, 44, 46
Fullerenes	24, 29	<b>U</b>	
<b>G</b>		UV-absorbers in cosmetics	36
Glyconucleotides	27	<b>V</b>	
Glucosides	24, 33	Vitamins (water-soluble)	23, 24, 25, 26, 29
Grapefruit oil	30	Vitamins (fat-soluble)	23
<b>H</b>		<b>X</b>	
Herbicides	27	Xanthines	33
<b>I</b>		<b>Z</b>	
Insulin	26	Zirconia phases	6, 7
<b>K</b>			
Ketones	29, 33		
<b>L</b>			
Limonene	30		

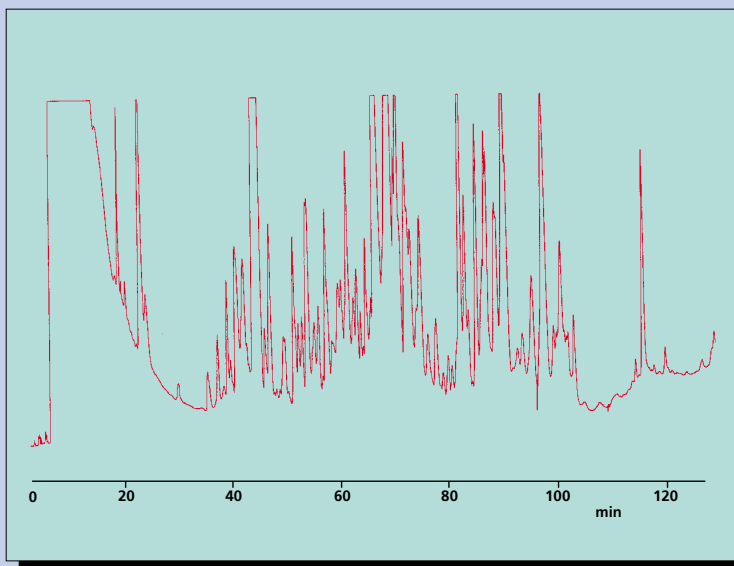
# Applications

## 01 170 Tryptic Digest of $\beta$ -Casein (bovine)



**Column phase:** GROM Ruby C18, 2  $\mu$ m  
**Column size:** 125 mm x 300  $\mu$ m  
**Eluent A:** 0.1 % TFA, 99.9% H<sub>2</sub>O  
**B:** 60% ACN, 0.1% TFA, 39.9% H<sub>2</sub>O  
**Gradient:** 0% B (0-3 min), 0-25% B (3-50 min),  
25-60% B (50-140 min),  
60-100% B (140-160 min)  
**Flow rate:** 5  $\mu$ l/min  
**Pressure:** 10.5 MPa  
**Temperature:** RT  
**Detection (UV):** 214 nm  
**Injection:** 10  $\mu$ l (= 100 pmol)

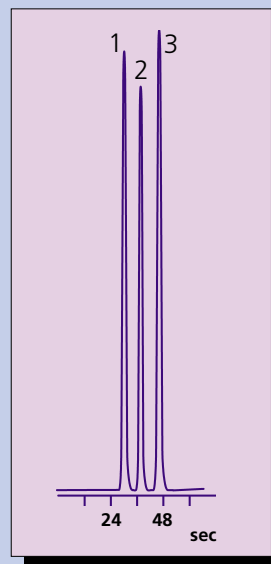
## 01 171 Tryptic Digest of Human Insulin Receptor ( $\beta$ -subunit)



**Column phase:** GROM Ruby C18, 2  $\mu$ m  
**Column size:** 125 mm x 300  $\mu$ m  
**Eluent A:** 0.05 % TFA, 99.95% H<sub>2</sub>O  
**B:** 80% ACN, 0.05% TFA, 19.95% H<sub>2</sub>O  
**Gradient:** 0-5% B (0-11 min), 5 - 5% B  
(11-20 min),  
5-45% B (20-100 min),  
45-95% B (100-130 min)  
**Flow rate:** 5  $\mu$ l/min  
**Pressure:** 10 MPa  
**Temperature:** RT  
**Detection (UV):** 214 nm  
**Injection:** 100  $\mu$ l (~ 40 pmol)

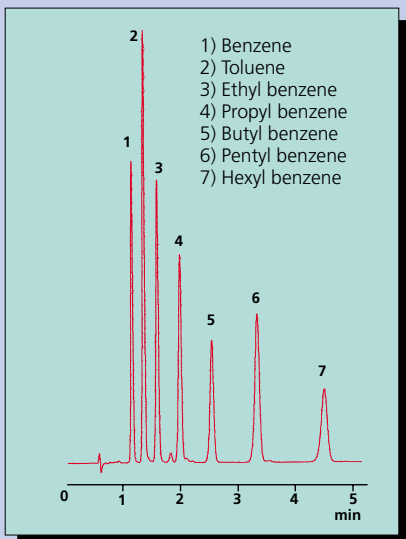
## 10 183 High Speed Analysis of Drugs

- 1) Hypoxanthine
- 2) Theobromine
- 3) Theophyllin



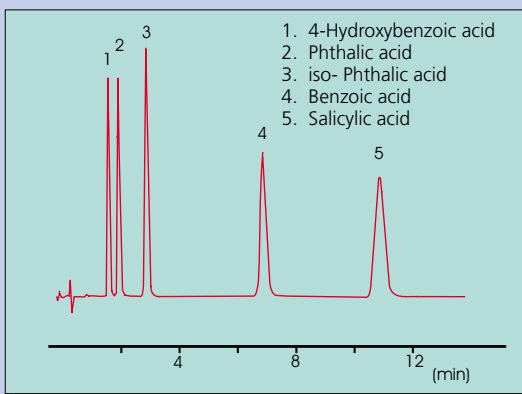
**Column phase:** GROM-Ruby C18, 2  $\mu$ m  
**Column size:** 50 x 1 mm  
**Eluent:** 20 mM Na-Phosphate,  
pH 2.5 / ACN = 90 / 10  
**Flow rate:** 50  $\mu$ l / min  
**Pressure:** 8 MPa  
**Temperature:** RT  
**Detection (UV):** 254 nm  
**Injection:** 1  $\mu$ l (0.5 ng of each)

### 01 155 Separation of n-Alkylbenzenes



**Column phase:** GROM- Sapphire 110 C18, 5  $\mu$ m  
**Column size:** 125 x 2 mm  
**Eluent:** H<sub>2</sub>O / ACN = 20 / 80  
**Flow rate:** 0.4 ml/min  
**Pressure:** 7 Mpa  
**Temperature:** RT  
**Detection (UV):** 254 nm  
**Injection:** 2  $\mu$ l (~3 mg/ml of each)

### 01 156 Separation of Organic Acids by Reversed Phase HPLC



**Column phase:** GROM- Sapphire 110 C18, 5  $\mu$ m  
**Column size:** 125 x 4 mm  
**Eluent:** H<sub>2</sub>O / ACN (+ 0.1% TFA) = 85 / 15  
**Flow rate:** 2 ml/min  
**Pressure:** 13 MPa  
**Temperature:** RT  
**Detection (UV):** 210 nm  
**Injection:** 10  $\mu$ l (0.01 to 2 mg/ml)

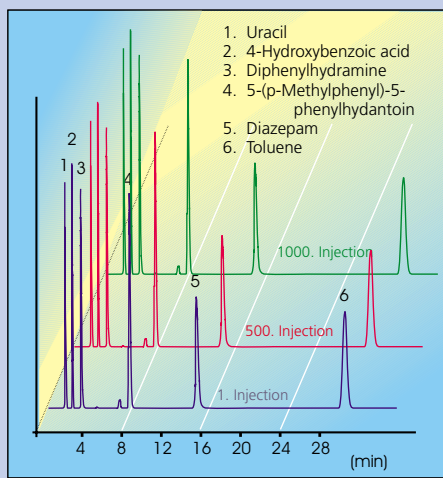
### 01 157 Drug Analysis (Antidepressives) by HPLC



1. Doxepin  
 2. Imipramine  
 3. Nortriptyline  
 4. Amitriptyline

**Column phase:** GROM- Sapphire 110 C18, 5  $\mu$ m  
**Column size:** 125 x 4 mm  
**Eluent:** H<sub>2</sub>O / ACN (+ 0.1% TFA) = 70 / 30  
**Flow rate:** 2 ml/min  
**Pressure:** 13 MPa  
**Temperature:** RT  
**Detection (UV):** 254 nm  
**Injection:** 10  $\mu$ l (0.4  $\mu$ g/ml of each)

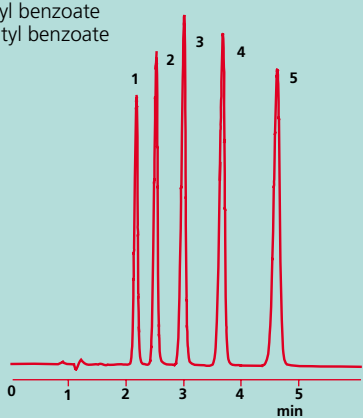
### 01 158 Stability of GROM-Sapphire Packings (Daldrup)



**Column phase:** GROM- Sapphire 110 C18, 5  $\mu$ m  
**Column size:** 125 x 4 mm  
**Eluent:** 50 mM Na-phosphate buffer, pH 2.3 / ACN = 58 / 42  
**Flow rate:** 1 ml/min  
**Pressure:** 8 MPa  
**Temperature:** RT  
**Detection (UV):** 230 nm  
**Injection:** 10  $\mu$ l (1-100 mg/ml of each)

## 01 159 Analysis of Benzoates

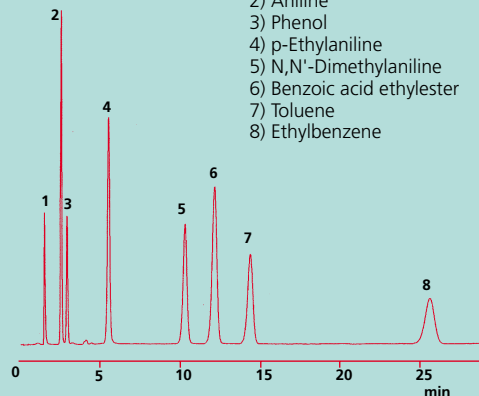
- 1) Methyl benzoate
- 2) Ethyl benzoate
- 3) Propyl benzoate
- 4) Butyl benzoate
- 5) Pentyl benzoate



**Column phase:** GROM- Sapphire 100 C18, 5  $\mu\text{m}$   
**Column size:** 125 x 2 mm  
**Eluent:** H<sub>2</sub>O / ACN = 20 / 80  
**Flow rate:** 0.2 ml/min  
**Pressure:** 2.6 MPa  
**Temperature:** RT  
**Detection (UV):** 254 nm (1.2  $\mu\text{l}$  flow cell)  
**Injection:** 2  $\mu\text{l}$  (50-150  $\mu\text{g/ml}$  of each)

## 01 160 Selectivity of GROM-Sapphire Packings (M.Arangio, H.Engelhardt)

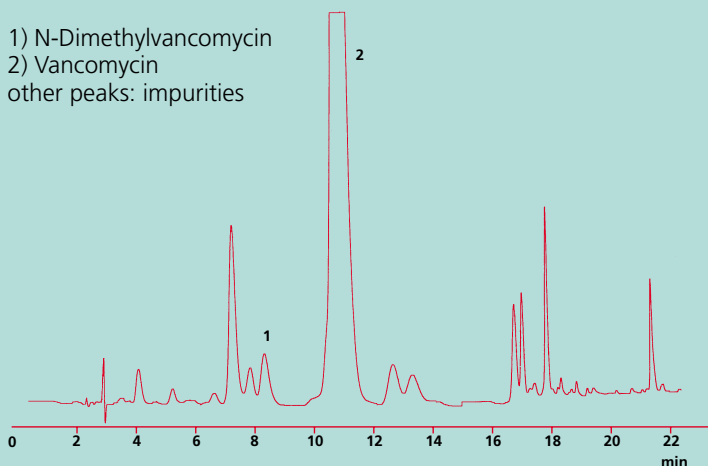
- 1) Uracil
- 2) Aniline
- 3) Phenol
- 4) p-Ethylaniline
- 5) N,N'-Dimethylaniline
- 6) Benzoic acid ethylester
- 7) Toluene
- 8) Ethylbenzene



**Column phase:** GROM- Sapphire 100 C18, 5  $\mu\text{m}$   
**Column size:** 125 x 2 mm  
**Eluent:** H<sub>2</sub>O / MeOH = 45 / 55 (v/v)  
**Flow rate:** 0.2 ml/min  
**Pressure:** 12.8 MPa  
**Temperature:** RT  
**Detection (UV):** 254 nm (1.2  $\mu\text{l}$  flow cell)  
**Injection:** 5  $\mu\text{l}$  (Uracil 30  $\mu\text{g/ml}$ , others 600  $\mu\text{g/ml}$ )

## 01 133 Analysis of Vancomycin by HPLC

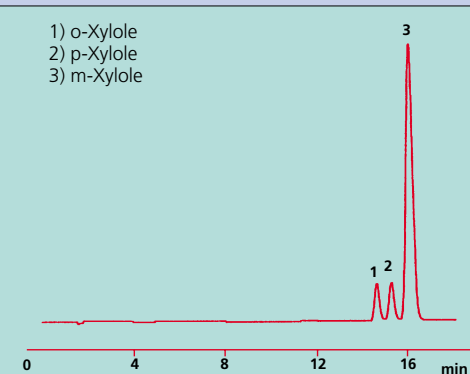
- 1) N-Dimethylvancomycin
  - 2) Vancomycin
- other peaks: impurities



**Column phase:** GROM-SIL 100 ODS-0 AB, 5  $\mu\text{m}$   
**Column size:** 250 x 4 mm  
**Eluent:** 0.1% H<sub>3</sub>PO<sub>4</sub> / ACN = 15 / 85  
**Flow rate:** 1.0 ml/min  
**Pressure:** 13 MPa  
**Temperature:** ambient  
**Detection (UV):** 210 nm  
**Injection:** 10  $\mu\text{l}$  (10  $\mu\text{g/ml}$ )

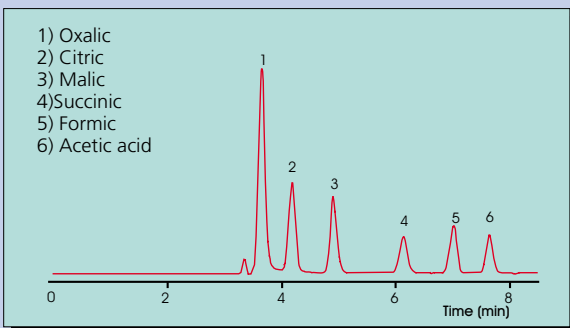
## 01 138 Xylol (Dimethylbenzene) Isomers

- 1) o-Xylol
- 2) p-Xylol
- 3) m-Xylol



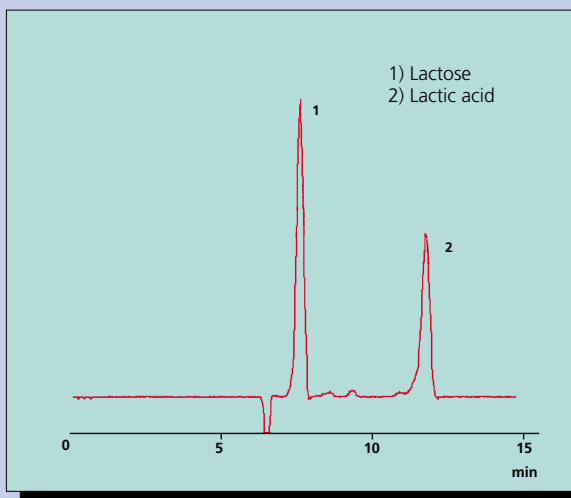
**Column phase:** GROM-SIL 60 ODS-5 ST, 5  $\mu\text{m}$   
**Column size:** 250 x 4 mm  
**Eluent:** H<sub>2</sub>O / ACN = 40 / 60  
**Flow rate:** 1.0 ml/min  
**Pressure:** 14 MPa  
**Temperature:** ambient  
**Detection (UV):** 254 nm  
**Injection:** 1  $\mu\text{l}$  (10  $\mu\text{g/ml}$ )

## 09 139 Analysis of Organic Acids



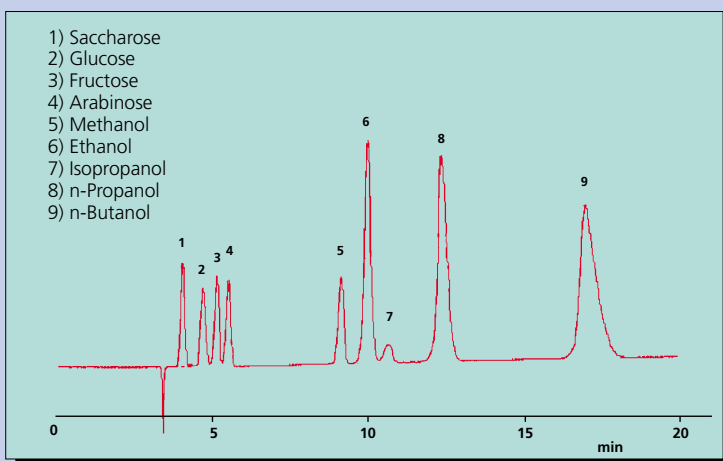
**Column phase:** GROM- RESIN H<sup>+</sup>IEX, 8 µm  
**Column size:** 250 x 8 mm  
**Eluent:** 9 mM sulfuric acid  
**Flow rate:** 1 ml/min  
**Pressure:** 9 MPa  
**Temperature:** 25°C  
**Detection (UV):** 210 nm  
**Injection:** 20 µl

## 09 142 Determination of Lactose and Lactic Acid



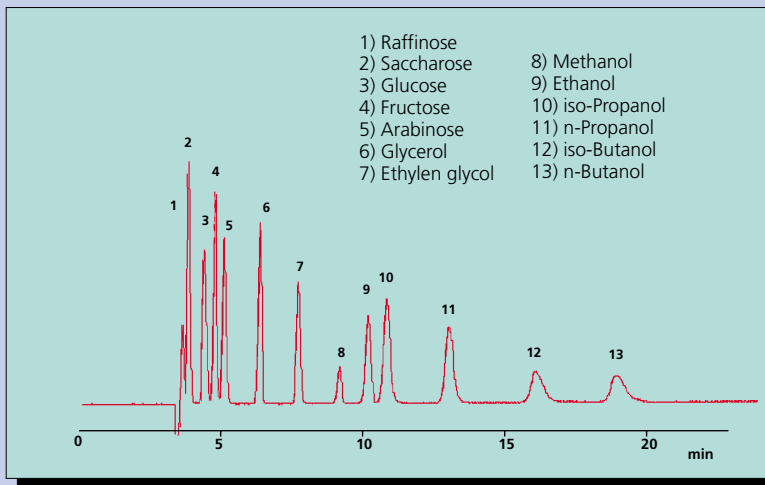
**Column phase:** GROM- RESIN H<sup>+</sup>IEX, 8 µm  
**Column size:** 250 x 8 mm  
**Eluent:** 9 mM sulfuric acid  
**Flow rate:** 0.5 ml/min  
**Pressure:** 4.5 MPa  
**Temperature:** ambient  
**Detection (UV):** 210 nm  
**Injection:** 10 µl

## 09 140 Separation of Sugars and Alcohols by HPLC



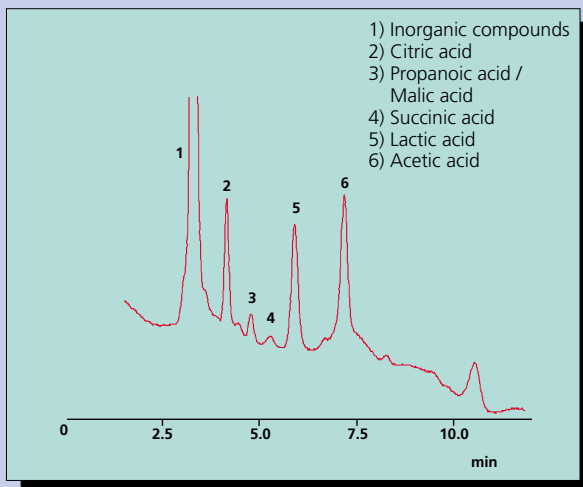
**Column phase:** GROM- RESIN H<sup>+</sup>IEX, 8 µm  
**Column size:** 250 x 8 mm  
**Eluent:** 9 mM sulfuric acid  
**Flow rate:** 1.0 ml/min  
**Pressure:** 9.0 MPa  
**Temperature:** ambient  
**Detection:** RI  
**Injection:** 5 µl

## 09 141 Analysis of Alcohols and Sugars



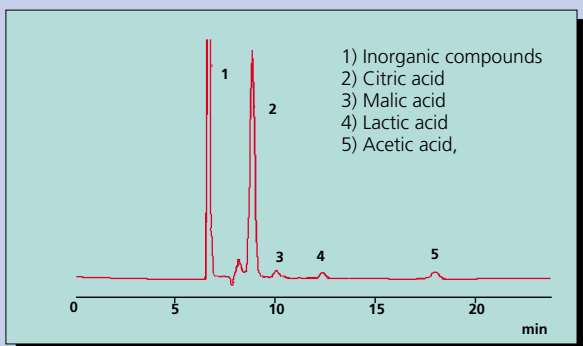
**Column phase:** GROM- RESIN H<sup>+</sup>IEX, 8 µm  
**Column size:** 250 x 8 mm  
**Eluent:** 9 mM sulfuric acid  
**Flow rate:** 1.0 ml/min  
**Pressure:** 9.0 MPa  
**Temperature:** 25°C  
**Detection (UV):** 210 nm  
**Injection:** 20 µl

### 09 143 Determination of Organic Acids in Trichomonas foetus extract



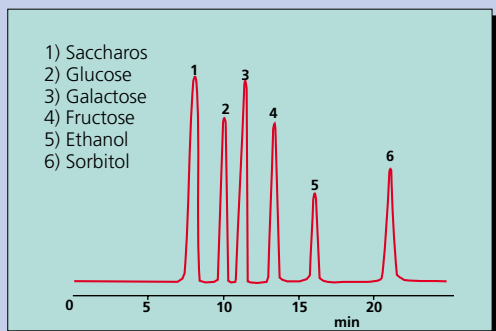
**Column phase:** GROM- RESIN H<sup>+</sup>EX, 8 µm  
**Column size:** 250 x 8 mm  
**Eluent:** 9 mM sulfuric acid  
**Flow rate:** 0.5 ml/min  
**Pressure:** 4.5 MPa  
**Temperature:** ambient  
**Detection (UV):** 210 nm  
**Injection:** 10 µl

### 09 145 Analysis of Organic Acids in Soft Drinks



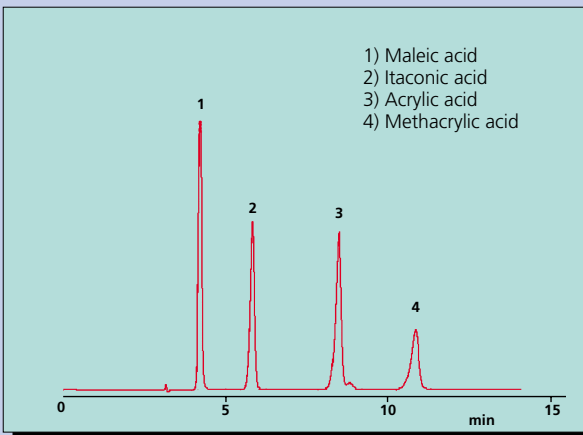
**Column phase:** GROM- RESIN H<sup>+</sup>EX, 8 µm  
**Column size:** 250 x 8 mm  
**Eluent :** 9 mM sulfuric acid  
**Flow rate:** 0.5 ml/min  
**Pressure:** 9 MPa  
**Temperature:** ambient  
**Detection (UV):** 210 nm  
**Injection:** 20 µl (degassed soft drink)

### 09 147 Sugar Analysis



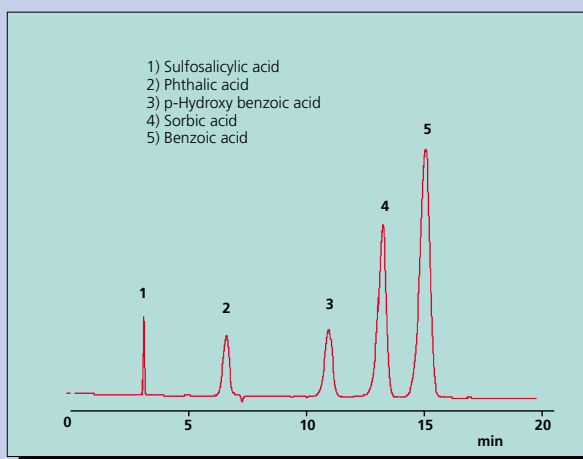
**Column phase:** GROM- RESIN Ca<sup>++</sup>EX, 8 µm  
**Column size:** 250 x 8 mm  
**Eluent:** water  
**Flow rate:** 0.5 ml/min  
**Pressure:** 3.5 MPa  
**Temperature:** 80°C  
**Detection:** RI  
**Injection:** 20 µl

### 09 144 Separation of Organic Acids



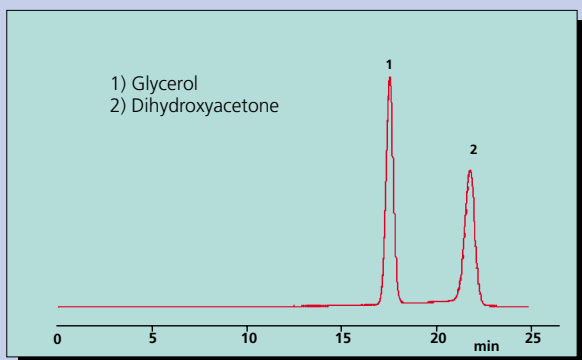
**Column phase:** GROM- RESIN H<sup>+</sup>EX, 8 µm  
**Column size:** 250 x 8 mm  
**Eluent:** 9 mM sulfuric acid  
**Flow rate:** 1.0 ml/min  
**Pressure:** 5 MPa  
**Temperature:** 80°C  
**Detection (UV):** 210 nm  
**Injection:** 5 µl

### 09 146 Analysis of Aromatic Acids



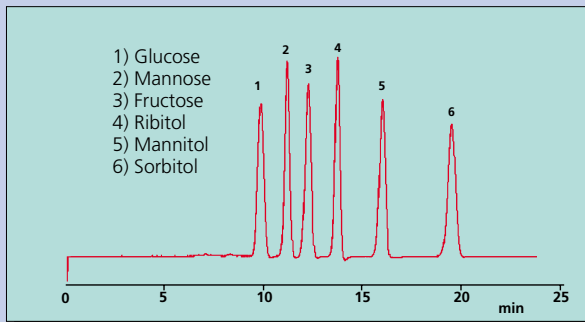
**Column phase:** GROM- RESIN H<sup>+</sup>EX, 8 µm  
**Column size:** 250 x 8 mm  
**Eluent:** 9 mM sulfuric acid  
**Flow rate:** 1.0 ml/min  
**Pressure:** 9 MPa  
**Temperature:** 80°C  
**Detection (UV):** 240 nm  
**Injection:** 20 µl

### 09 148 Determination of Glycerol and Dihydroxyacetone



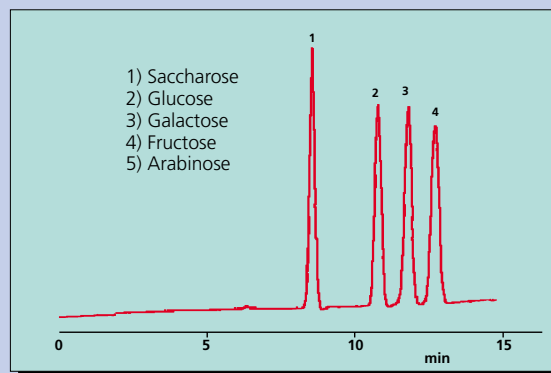
**Column phase:** GROM- RESIN Ca<sup>++</sup>IEX, 8 µm  
**Column size:** 250 x 8 mm  
**Eluent:** water  
**Flow rate:** 0.5 ml/min  
**Pressure:** 3.5 MPa  
**Temperature:** 80°C  
**Detection:** RI  
**Injection:** 20 µl

### 09 149 Analysis of Alcohol Sugars



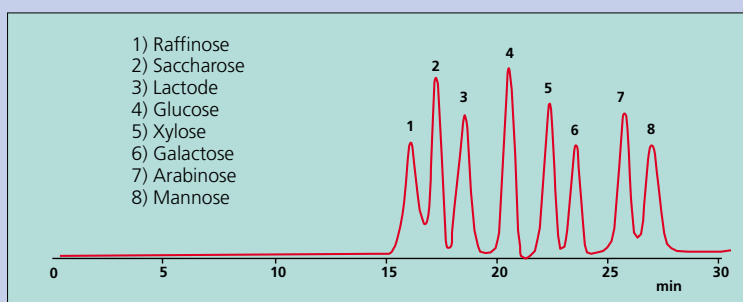
**Column phase:** GROM- RESIN Ca<sup>++</sup>IEX, 8 µm  
**Column size:** 250 x 8 mm  
**Eluent:** water  
**Flow rate:** 0.5 ml/min  
**Pressure:** 3.5 MPa  
**Temperature:** 80°C  
**Detection:** RI  
**Injection:** 10 µl

### 09 150 Saccharides Analysis



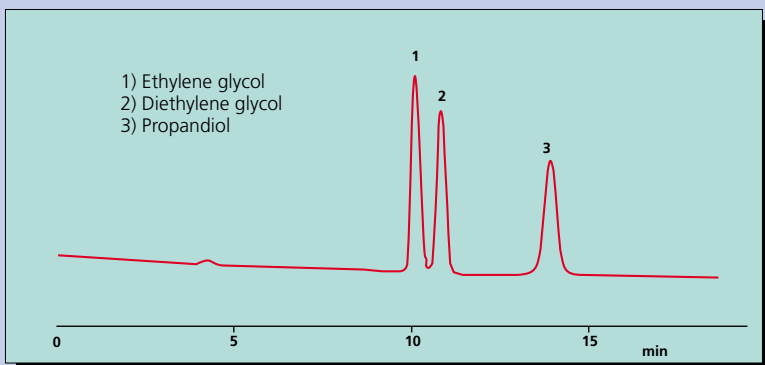
**Column phase:** GROM- RESIN Na<sup>+</sup>IEX, 8 µm  
**Column size:** 250 x 8 mm  
**Eluent:** water  
**Flow rate:** 0.5 ml/min  
**Pressure:** 3.0 MPa  
**Temperature:** 80°C  
**Detection:** RI  
**Injection:** 10 µl

### 09 151 Analysis of Saccharides by HPLC



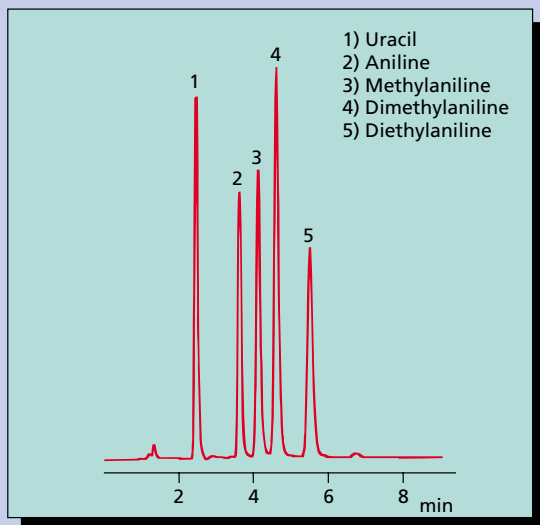
**Column phase:** GROM- RESIN Pb<sup>++</sup>IEX, 8 µm  
**Column size:** 250 x 8 mm  
**Eluent:** water  
**Flow rate:** 0.3 ml/min  
**Pressure:** 1.0 MPa  
**Temperature:** 80°C  
**Detection:** RI  
**Injection:** 5 µl

### 09 152 Analysis of Glycols by HPLC



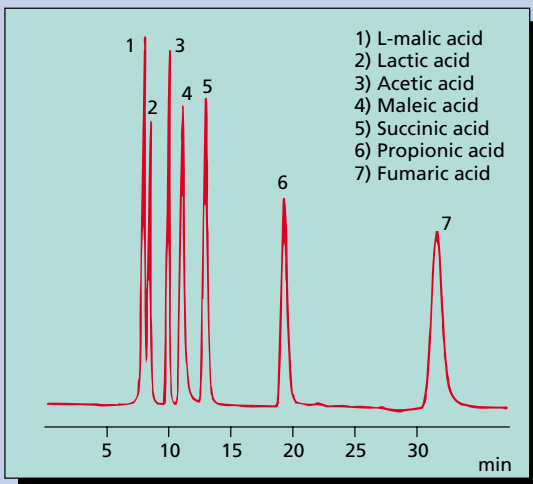
**Column phase:** GROM- RESIN Pb<sup>++</sup>IEX, 8 µm  
**Column size:** 250 x 8 mm  
**Eluent:** water  
**Flow rate:** 0.3 ml/min  
**Pressure:** 1.0 MPa  
**Temperature:** 80°C  
**Detection:** RI  
**Injection:** 5 µl

### 01 153 Analysis of Basic Compounds by HPLC



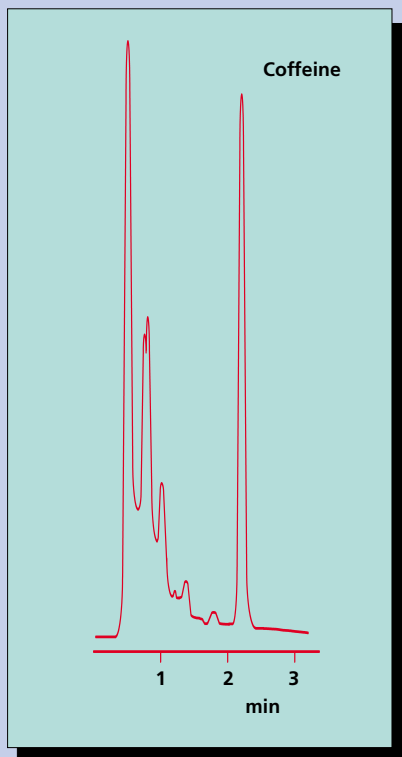
**Column phase:** GROM- Polymer C18, 5  $\mu$ m  
**Column size:** 250 x 4 mm  
**Eluent:** H<sub>2</sub>O / ACN = 20 / 80  
**Flow rate:** 0.5 ml/min  
**Pressure:** 4.5 MPa  
**Temperature:** 25°C  
**Detection (UV):** 254 nm  
**Injection:** 4  $\mu$ l (10 -15  $\mu$ g/ml of each)

### 01 154 Analysis of Organic Acids by HPLC



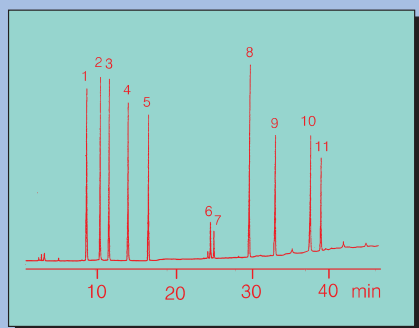
**Column phase:** GROM- Polymer C18, 5  $\mu$ m  
**Column size:** 250 x 4 mm  
**Eluent:** 20 mM H<sub>3</sub>PO<sub>4</sub>  
**Flow rate:** 0.4 ml/min  
**Pressure:** 5.2 MPa  
**Temperature:** 30°C  
**Detection (UV):** 254 nm  
**Injection:** 10  $\mu$ l (10-100  $\mu$ g/ml of each)

### 02 168 HPLC Analysis of Coffee



**Column phase:** GROM-SIL 120 Octyl-5 CP, 3  $\mu$ m  
**Column size:** 75 x 3 mm  
**Eluent:** Water/Methanol = 85/15  
**Flow rate:** 0.8  $\mu$ l/min  
**Pressure:** 9 MPa  
**Temperature:** RT  
**Detection (UV):** 254 nm  
**Injection:** 10  $\mu$ l Coffee

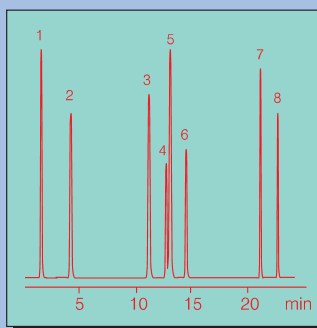
## 01 001 Color Additives - Dyes



- 1) Tartrazine
- 2) Amaranth
- 3) Indigo Carmine
- 4) New Coccine
- 5) Sunset Yellow
- 6) Fast Green
- 7) Brilliant Blue
- 8) Erythrosine
- 9) Acid Red
- 10) Phloxine
- 11) Rosé Bengale

**Column phase:** GROM-SIL 120 ODS-5 ST, 5  $\mu$ m  
**Column size:** 150 x 4 mm  
**Eluent A:** 10 mM  $\text{NH}_4$ -phosphate, pH 6.0 / MeOH = 90 / 10  
**B:** 10 mM  $\text{NH}_4$ -phosphate, pH 6.0 / MeOH = 20 / 30  
**Gradient:** 0 - 100% B (0 - 40 min, linear), 100% B (40-60 min)  
**Flow rate:** 0.8 ml/min  
**Pressure:** 11 MPa  
**Temperature:** 30°C  
**Detection (UV):** 254 nm, 0.32 AUFS  
**Injection:** 80  $\mu$ l (5 mg / ml)

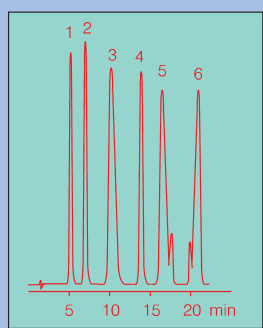
## 01 004 Water-soluble Vitamins



- 1) L-Ascorbic acid (Vit.C)
- 2) Nicotinic acid
- 3) Pyridoxine HCl (Vit. B6)
- 4) Nicotinamide,
- 5) Thiamine hydrochloride (Vit. B1)
- 6) Folic acid
- 7) Cyanocobalamin (Vit. B12)
- 8) Riboflavin

**Column phase:** GROM-SIL 120 ODS-5 ST, 5  $\mu$ m  
**Column size:** 150 x 4 mm  
**Eluent A:** 20 mM K-phosphate, pH 6.6  
**B:** 20 mM K-phosphate, pH 6.6 / ACN = 80 / 20  
**Gradient:** 0% B (0-5 min), 0-100% B (5-20 min,linear), 100% B (20-25 min)  
**Flow rate:** 0.8 ml/min  
**Pressure:** 9 MPa  
**Temperature:** 30°C  
**Detection (UV):** 254 nm, 0.32 AUFS  
**Injection:** 10  $\mu$ l (0.04 - 0.3 mg/ml)

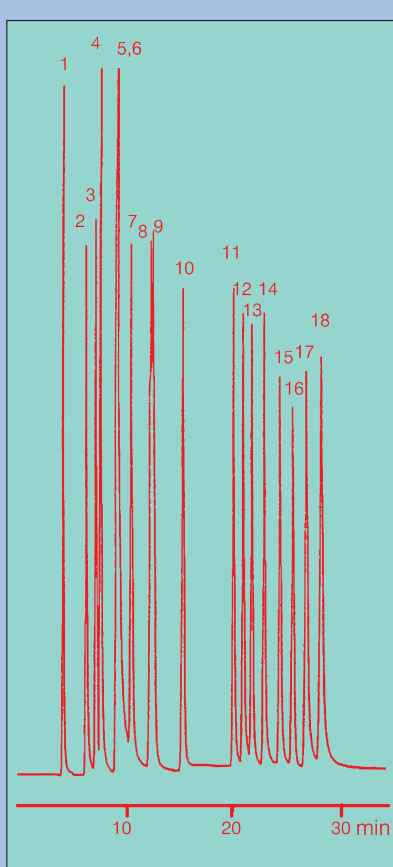
## 01 002 Peptides and Proteins



- 1) Met-Enkephalin
- 2) Leu-Enkephalin
- 3) Bovine Serum Albumin
- 4)  $\alpha$ -Mating-Factor
- 5) Insulin
- 6) Ovalbumin

**Column phase:** GROM-SIL 120 ODS-5 ST, 5  $\mu$ m  
**Column size:** 150 x 4 mm  
**Eluent A:** ACN /  $\text{H}_2\text{O}$  / TFA = 20 / 80 / .05  
**B:** ACN /  $\text{H}_2\text{O}$  / TFA = 45 / 55 / .05  
**Gradient:** 0 - 100% B, (0-30 min)  
**Flow rate:** 0.8 ml/min  
**Pressure:** 10 MPa  
**Temperature:** 30°C  
**Detection (UV):** 220 nm, 0.32 AUFS  
**Injection:** 30  $\mu$ l (0.5-2  $\mu$ g)

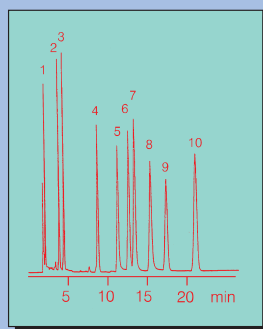
## 01 005 Nucleosides and Bases



- 1) Cytosine
- 2) Cytidine
- 3) Uracil
- 4) Deoxycytidine
- 5) Guanine
- 6) Adenine
- 7) Hypoxanthine
- 8) Uridine
- 9) Xanthine
- 10) Thymine
- 11) Inosine
- 12) Guanosine
- 13) Deoxyinosine
- 14) Deoxyguanosine
- 15) Xanthosine
- 16) Thymidine
- 17) Adenosine
- 18) Deoxyadenosine

**Column phase:** GROM-SIL 120 ODS-5 ST, 5  $\mu$ m  
**Column size:** 250 x 4 mm  
**Eluent A:** 20 mM  $\text{NH}_4$ -acetate, pH 3.5  
**B:** 20 mM  $\text{NH}_4$ -acetate, pH 3.5 / MeOH = 90 / 10  
**Gradient:** 30% B (0-5 min), 30-100% B (5-13 min), 100% B (13-40 min)  
**Flow rate:** 0.5 ml/min  
**Pressure:** 8.5 MPa  
**Temperature:** 30°C  
**Detection (UV):** 260 nm, 0.08 AUFS  
**Injection:** 12  $\mu$ l (10-50  $\mu$ g/ml)

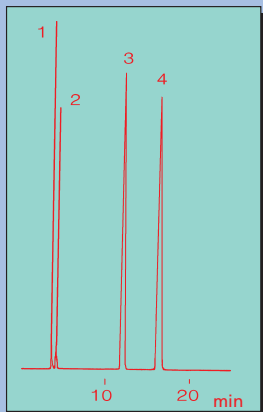
## 01 003 Fat-soluble Vitamins



- 1) Menadione (Vit. K3)
- 2) Retinol (Vit. A)
- 3) Retinol acetate
- 4) Menaquinone (Vit. K2)
- 5) d-Tocopherol
- 6) Ergocalciferol (Vit. D2)
- 7) Cholecalciferol (Vit. D3)
- 8)  $\alpha$ -Tocopherol (Vit. E)
- 9)  $\alpha$ -Tocopherol acetate,
- 10) Phylloquinone (Vit. K1)

**Column phase:** GROM-SIL 120 ODS-5 ST, 5  $\mu$ m  
**Column size:** 150 x 4 mm  
**Eluent:** acetonitrile  
**Flow rate:** 0.8 ml/min  
**Pressure:** 7 MPa  
**Temperature:** 30°C  
**Detection (UV):** 280 nm, 0.08 AUFS  
**Injection:** 15  $\mu$ l (0.01-0.2 mg/ml)

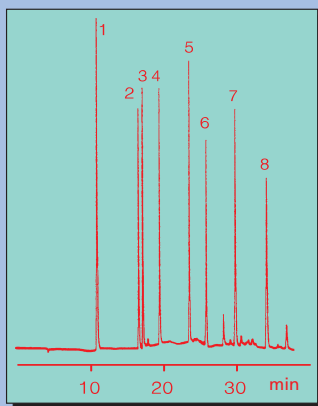
## 01 006 Antineoplastics and related compounds



- 1) Uracil
- 2) 5-Fluorouracil
- 3) Deoxyuridine
- 4) 5-Fluoro-2'-deoxyuridine

Column phase: GROM-SIL 120 ODS-5 ST, 5  $\mu$ m  
 Column size: 150 x 4 mm  
 Eluent: 10 mM  $\text{NH}_4\text{H}_2\text{PO}_4$   
 Flow rate: 0.8 ml/min  
 Pressure: 8 MPa  
 Temperature: 37°C  
 Detection (UV): 254 nm, 0.16 AUFS  
 Injection: 10  $\mu$ l (25-200  $\mu$ g/ml)

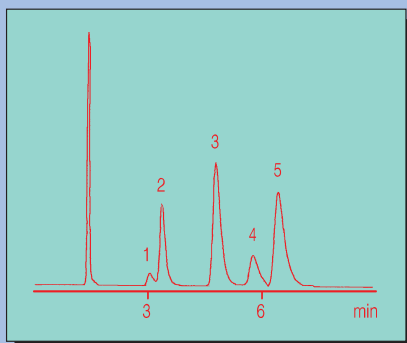
## 01 007 Crude Drugs - Glycosides



- 1) Arbutin
- 2) Salicin
- 3) Esculine
- 4) Strophantoin G (Ouabain)
- 5) Baicalein
- 6) Barbaloin
- 7) Glycyrrhizin
- 8) Digitoxin

Column phase: GROM-SIL 120 ODS-5 ST, 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent A: 20 mM  $\text{NH}_4\text{H}_2\text{PO}_4$  / MeOH = 95 / 5  
 B: 20 mM  $\text{NH}_4\text{H}_2\text{PO}_4$  / MeOH = 20 / 80  
 Gradient: 0-100% B (0-20 min, linear), 100% B (20-40 min)  
 Flow rate: 0.5 ml/min  
 Pressure: 9 MPa  
 Temperature: 30°C  
 Detection (UV): 250 nm, 0.08 AUFS  
 Injection: 15  $\mu$ l (10-500  $\mu$ g/ml)

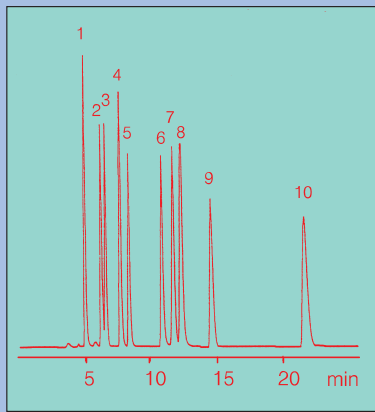
## 08 008 Regioisomeric Fullerene Derivatives



- 1) trans-1-C62(COOEt)<sub>4</sub>
- 2) trans-2-C62(COOEt)<sub>4</sub>
- 3) trans-3-C62(COOEt)<sub>4</sub>
- 4) trans-4-C62(COOEt)<sub>4</sub>
- 5) e-C62(COOEt)<sub>4</sub>

Column phase: GROM-SIL 100 Norm Ph-1 ST, 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent: toluene  
 Flow rate: 1.5 ml/min  
 Pressure: 12 MPa  
 Temperature: RT  
 Detection (UV): 340 nm, 0.08 AUFS  
 Injection: 5  $\mu$ l (50  $\mu$ g/ml)

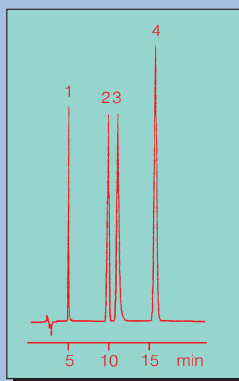
## 01 009 Organic Acids



- 1) Glycolic acid
- 2) L-Malic acid
- 3) Malonic acid
- 4) Lactic acid
- 5) Acetic acid
- 6) Maleic acid
- 7) Citric acid
- 8) Fumaric acid
- 9) Succinic acid
- 10) Propionic acid

Column phase: GROM-SIL 120 ODS-5 ST, 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent: 20 mM Na-phosphate, pH 2.8  
 Flow rate: 0.5 ml/min  
 Pressure: 7 MPa  
 Temperature: 30°C  
 Detection (UV): 220 nm, 0.08 AUFS  
 Injection: 10  $\mu$ l (0.01-2 mg/ml)

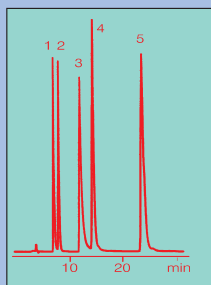
## 01 010 Water-soluble Vitamins



- 1) p-Aminobenzoic acid
- 2) Biotin (Vit. H)
- 3) Cyanocobalamin (Vit. B12)
- 4) Riboflavin (Vit. B2)

Column phase: GROM-SIL 120 ODS-5 ST, 5  $\mu$ m  
 Column size: 150 x 4 mm  
 Eluent: 50 mM  $\text{NH}_4\text{H}_2\text{PO}_4$  / ACN = 90 / 10  
 Flow rate: 0.8 ml/min  
 Pressure: 7 MPa  
 Temperature: 37°C  
 Detection (UV): 210 nm, 0.16 AUFS  
 Injection: 10  $\mu$ l (20-300  $\mu$ g/ml)

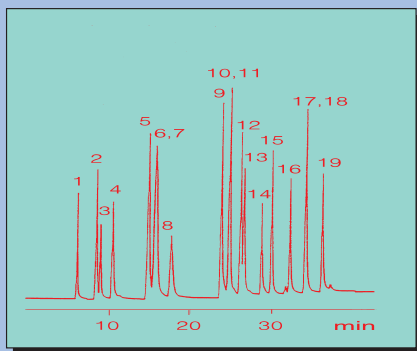
## 01 011 Angiotensins - Peptide Hormones



- 1) Angiotensin III - RVYIHPF
- 2) Angiotensin II - DRVYIHPF
- 3) [Asn1, Val15]-Angiotensin I - NRVYVHPFHL
- 4) [Val15]-Angiotensin I - DRVYVHPFHL
- 5) Angiotensin I - DRVYIHPFHL

Column phase: GROM-SIL 120 ODS-5 ST, 5  $\mu$ m  
 Column size: 150 x 4 mm  
 Eluent: 20 mM  $\text{KH}_2\text{PO}_4$  / ACN = 80 / 20  
 Flow rate: 0.4 ml/min  
 Pressure: 4.5 MPa  
 Temperature: 30°C  
 Detection (UV): 220 nm, 0.08 AUFS  
 Injection: 8  $\mu$ l (50-150  $\mu$ g/ml)

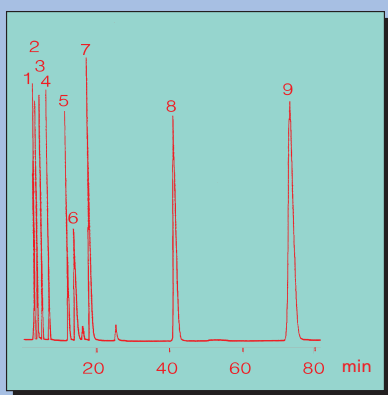
## 01 012 Nucleotides



- 1) 5'-CMP
- 2) 5'-UMP
- 3) 5'-dCMP
- 4) 5'-CDP
- 5) 5'-GMP
- 6) 5'-UDP
- 7) 5'-IMP
- 8) 5'-CTP
- 9) 5'-UTP
- 10) 5'-GDP
- 11) 5'-TMP
- 12) 5'-AMP
- 13) 5'-dGMP
- 14) 5'-GTP
- 15) 5'-TDP
- 16) 5'-ADP
- 17) 5'-TTP
- 18) 5'-dAMP
- 19) 5'-ATP

Column phase: GROM-SIL 120 ODS-5 ST, 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent A: 0.2 M TEAA, pH 6.6  
 B: 0.2 M TEAA, pH 6.6 / ACN = 95 / 5  
 Gradient: 4% B (0-10 min), 4-100% B(10-35 min), 100% B (35-50 min)  
 Flow rate: 0.8 ml/min  
 Pressure: 12 - 13 MPa  
 Temperature: 30°C  
 Detection (UV): 260 nm, 0.16 AUFS  
 Injection: 15  $\mu$ l (30-150  $\mu$ g/ml)

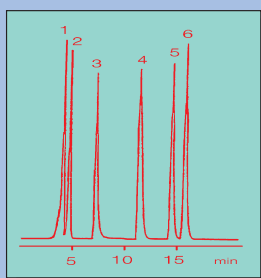
## 01 013 Alkaloids



- 1) Hordenine sulfate
- 2) Pilocarpine chloride
- 3) Scopolamine bromide
- 4) Atropine sulfate
- 5) Quinine
- 6) Sparteine sulfate
- 7) Cinchonine
- 8) Papaverine chloride
- 9) Narcotine chloride

Column phase: GROM-SIL 120 ODS-5 ST, 5  $\mu$ m  
 Column size: 150 x 4 mm  
 Eluent A: 20 mM  $\text{KH}_2\text{PO}_4$  / ACN = 83 / 17  
 B: 20 mM  $\text{KH}_2\text{PO}_4$  / ACN = 60 / 40  
 Gradient: 0-100% B (0-30 min), 100% B (30-40 min)  
 Flow rate: 0.5 ml/min  
 Pressure: 5.4 MPa  
 Temperature: 30°C  
 Detection (UV): 210 nm, 0.16 AUFS  
 Injection: 5  $\mu$ l (0.03 - 2 mg/ml)

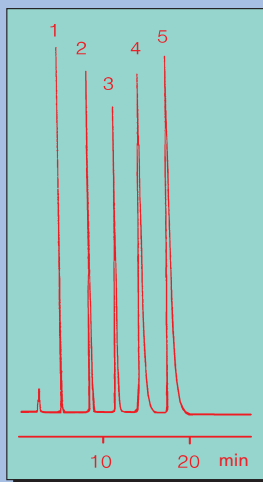
## 01 014 Ingredients in a Cough/Cold Medication



- 1) Acetaminophen
- 2) Caffeine
- 3) Chlorpheniramine malate
- 4) Narcotine
- 5) Ethenzamide
- 6) Bucetine

Column phase: GROM-SIL 120 ODS-5 ST, 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent: 0.1% phosphoric acid / MeOH / ACN = 77 / 15 / 18  
 Flow rate: 0.8 ml/min  
 Pressure: 15 MPa  
 Temperature: 30°C  
 Detection (UV): 254 nm, 0.08 AUFS  
 Injection: 10  $\mu$ l (20 - 200  $\mu$ g/ml)

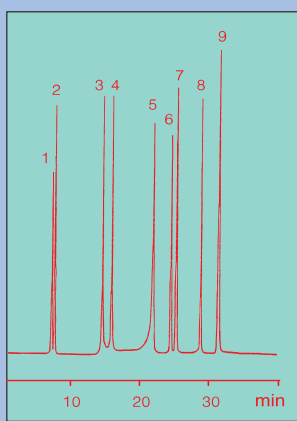
## 01 015 Water-soluble Vitamins



- 1) Nicotinic acid
- 2) Pantothenic acid
- 3) Pyridoxine hydrochloride (Vit. B6)
- 4) Nicotinamide,
- 5) Thiamine hydrochloride (Vit. B1)

Column phase: GROM-SIL 120 ODS-5 ST, 5  $\mu$ m  
 Column size: 150 x 4 mm  
 Eluent: 20 mM Na-phosphate, pH 6.5  
 Flow rate: 0.8 ml/min  
 Pressure: 12 MPa  
 Temperature: 30°C  
 Detection (UV): 210 nm, 0.08 AUFS  
 Injection: 10  $\mu$ l (20 - 600  $\mu$ g/ml)

## 01 016 Antibiotics

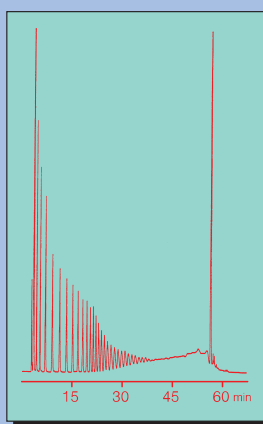


- 1) Ampicillin
- 2) Cephalixin
- 3) Oxytetracycline hydrochloride
- 4) Tetracycline
- 5) Chlorotetracycline
- 6) Chloramphenicol
- 7) Oxolinic acid
- 8) Doxorubicine hydrochloride
- 9) Nalidixic acid

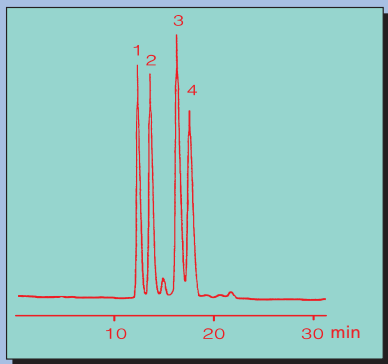
Column phase: GROM-SIL 120 ODS-5 ST, 5  $\mu$ m  
 Column size: 150 x 4 mm  
 Eluent A: 50 mM  $\text{NH}_4\text{H}_2\text{PO}_4$  / ACN = 90 / 10  
 B: 50 mM  $\text{NH}_4\text{H}_2\text{PO}_4$  / ACN = 50 / 50  
 Gradient: 0-55% B (0-30 min), 55% B (30-40 min)  
 Flow rate: 0.8 ml/min  
 Pressure: 10 MPa  
 Temperature: 30°C  
 Detection (UV): 250 nm, 0.16 AUFS

Injection: 15  $\mu$ l (10 - 150  $\mu$ g/ml)

## 01 017 Poly(A) Oligomers

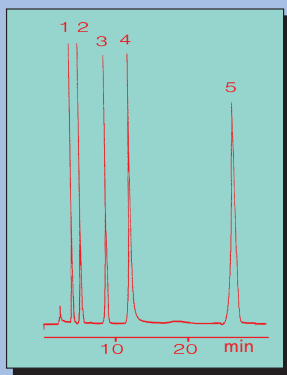


Column phase: GROM-SIL 120 ODS-5 ST, 5  $\mu$ m  
 Column size: 150 x 4 mm  
 Eluent A: 0.1 M Na-phosphate, pH 7.0  
 B: 0.1 M Na-phosphate, pH 7.0 / ACN = 75 / 25  
 Gradient: 20-27% B (0-15 min), 27-35% B (15-90 min)  
 Flow rate: 0.8 ml/min  
 Pressure: 8 MPa  
 Temperature: RT  
 Detection (UV): 260 nm  
 Injection: 10  $\mu$ l

**01 018 Insulins from different species**

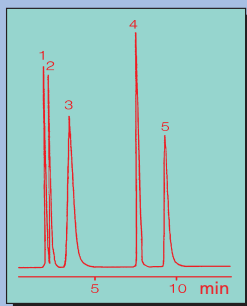
- 1) Insulin (Bovine)
- 2) Insulin (Sheep)
- 3) Insulin (Human)
- 4) Insulin (Porcine)

Column phase: GROM-SIL 120 ODS-5 ST, 5 µm  
 Column size: 150 x 4 mm  
 Eluent A: 0.01 N HCl / ACN = 72 / 28  
 B: 0.01 N HCl / ACN = 65 / 35  
 Gradient: 0-100% B (0 - 60 min)  
 Flow rate: 0.8 ml/min  
 Pressure: 9 MPa  
 Temperature: 30°C  
 Detection (UV): 220 nm, 0.16 AUFS  
 Injection: 50 µl (100 - 200 µg/ml)

**01 019 Polyphenols - I**

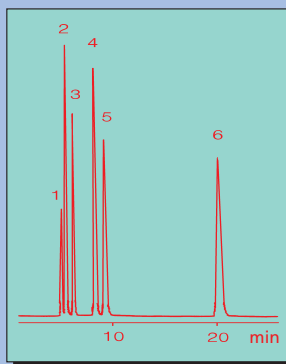
- 1) Phloroglucinol
- 2) Hydrochinone
- 3) Resorcinol
- 4) Catechol
- 5) Phenol

Column phase: GROM-SIL 120 ODS-5 ST, 5 µm  
 Column size: 250 x 4 mm  
 Eluent: 50 mM phosphoric acid / ACN = 90 / 10  
 Flow rate: 0.8 ml/min  
 Pressure: 15 MPa  
 Temperature: 30°C  
 Detection (UV): 280 nm, 0.32 AUFS  
 Injection: 20 µl (5 - 15 µg)

**01 020 Water-soluble Vitamins**

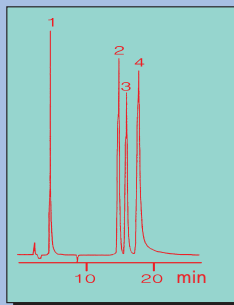
- 1) L-Ascorbic acid
- 2) Orotic acid
- 3) Pyrroloquinoline quinone
- 4) Pyridoxine hydrochloride
- 5) Nicotinamide

Column phase: GROM-SIL 120 ODS-5 ST, 5 µm  
 Column size: 150 x 4 mm  
 Eluent: 100 mM ammonium acetate, pH 5.1  
 Flow rate: 0.8 ml/min  
 Pressure: 8 MPa  
 Temperature: 37°C  
 Detection (UV): 254 nm, 0.16 AUFS  
 Injection: 10 µl (40 - 200 µg/ml)

**01 021 Nucleosides**

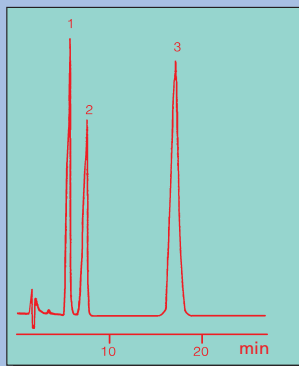
- 1) 2,6,8-Trihydroxypurine (Uric acid)
- 2) Hypoxanthine
- 3) Xanthine
- 4) Inosine
- 5) Guanosine
- 6) Adenosine

Column phase: GROM-SIL 120 ODS-5 ST, 5 µm  
 Column size: 150 x 4 mm  
 Eluent: 10 mM Na-acetate, pH 5.0 / ACN / THF = 955 / 30 / 5 (v/v)  
 Flow rate: 0.4 ml/min  
 Pressure: 4 MPa  
 Temperature: 30°C  
 Detection (UV): 254 nm, 0.08 AUFS  
 Injection: 10 µl (30 - 100 µg/ml)

**01 022 Metal chelates of 1-(2-Pyridylazo)-2-naphthol (PAN)**

- 1) Cu II-PAN
- 2) Ni II-PAN
- 3) Fe III-PAN
- 4) Zn II-PAN

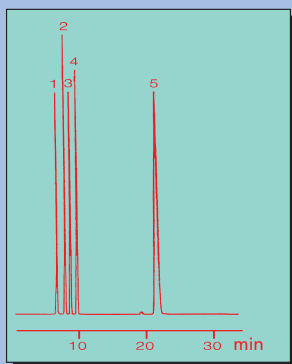
Column phase: GROM-SIL 120 ODS-5 ST, 5 µm  
 Column size: 150 x 4 mm  
 Eluent: 10 mM tetrabutylammonium bromide, 0.01% PAN / ACN = 30 / 70 (v/v)  
 Flow rate: 0.4 ml/min  
 Pressure: 40 MPa  
 Temperature: 30°C  
 Detection (VIS): 565 nm, 0.08 AUFS  
 Injection: 12 µl (25 - 95 µg/ml)

**01 023 Cyclodextrins**

- 1) γ-Cyclodextrin
- 2) α-Cyclodextrin
- 3) β-Cyclodextrin

Column phase: GROM-SIL 120 ODS-5 ST, 5 µm  
 Column size: 150 x 4 mm  
 Eluent: water / methanol = 95 / 5 (v/v)  
 Flow rate: 0.8 ml/min  
 Pressure: 8.8 MPa  
 Temperature: 30°C  
 Detection: RI  
 Injection: 5 µl (20 - 60 µg)

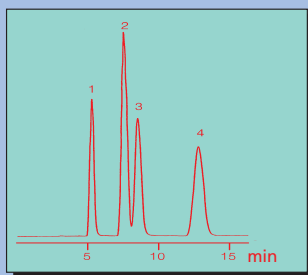
## 01 024 Sugar Nucleotides



- 1) CDP-D-glucose
- 2) UDP-D-glucose
- 3) UDP-N-acetyl-D-glucosamine
- 4) GDP-D-mannose
- 5) ADP-D-glucose

Column phase: GROM-SIL 120 ODS-5 ST, 5  $\mu$ m  
 Column size: 250 x 4mm  
 Eluent: 20 mM triethylammonium acetate, pH 5.7 / ACN = 99 / 1  
 Flow rate: 0.8 ml/min  
 Pressure: 12 MPa  
 Temperature: 37°C  
 Detection (UV): 260 nm, 0.16 AUFS  
 Injection: 5  $\mu$ l (30 - 70  $\mu$ g/ml)

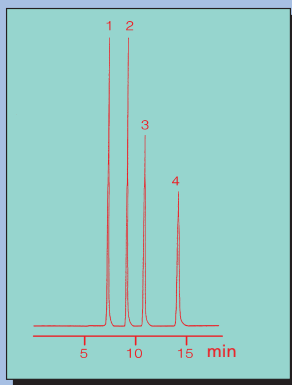
## 01 025 Herbicides - Residue Analysis by HPLC



- 1) 3,6-Dichloro-2-MGTH-oxybenzoic acid
- 2) p-Bromophenol
- 3) 2,4-Dichlorophenoxyacetic acid
- 4) (+)-2-(4-Chloro-2-MGTH-yl phenoxy) propionic acid

Column phase: GROM-SIL 120 ODS-4 HE, 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent: 22.5 mM K-phosphate, pH 2.9 / ACN = 75 / 25  
 Flow rate: 1 ml/min  
 Pressure: 8.5 MPa  
 Temperature: 35°C  
 Detection (UV): 280 nm  
 Injection: 20  $\mu$ l (1 - 2 mg/ml)

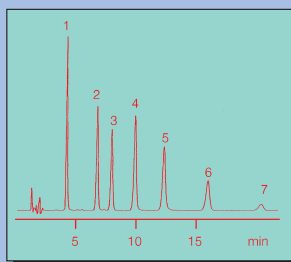
## 01 026 Catecholamines I



- 1) Noradrenaline
- 2) Adrenaline
- 3) 3,4-Dihydroxyphenylalanine (DOPA)
- 4) Dopamine

Column phase: GROM-SIL 120 ODS-4 HE, 5  $\mu$ m  
 Column size: 250 x 4mm  
 Eluent: 0.1 M Na-phosphate, pH 3.0 / ACN = 97 / 3  
 Flow rate: 0.4 ml/min  
 Pressure: 6 MPa  
 Temperature: RT  
 Detection (UV): 210 nm, 0.08 AUFS  
 Injection: 10  $\mu$ l (0.1 - 0.35  $\mu$ g)

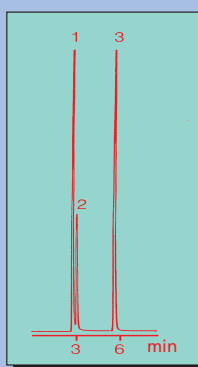
## 01 027 Catecholamines II



- 1) Noradrenaline
- 2) 3,4-Dihydroxyphenylacetic acid
- 3) 3,4-Dihydroxyphenylalanine
- 4) Dopamine
- 5) Epinine
- 6) Homovanillic acid
- 7) 3-O-Methyldopa

Column phase: GROM-SIL 120 ODS-4 HE, 5  $\mu$ m  
 Column size: 150 x 4 mm  
 Eluent: 6.9 g NaH<sub>2</sub>PO<sub>4</sub> + 37 mg EDTA + 150 mg Na-octane sulfonate + 60 ml ACN + 5 ml THF, make up to 1 000 ml with H<sub>2</sub>O  
 Flow rate: 0.8 ml/min  
 Pressure: 13 MPa  
 Temperature: RT  
 Detection: electrochemical  
 Injection: 20  $\mu$ l (200 ng/ml)

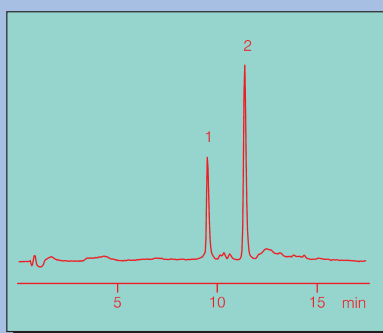
## 01 028 Sulfur-Containing Native Amino Acids



- 1) Cystine
- 2) Cysteine
- 3) Methionine

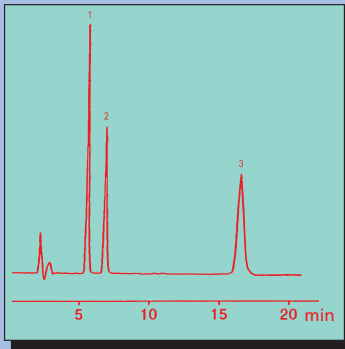
Column phase: GROM-SIL 120 ODS-4 HE, 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent: water  
 Flow rate: 0.8 ml/min  
 Pressure: 12 MPa  
 Temperature: RT  
 Detection (UV): 210 nm  
 Injection: 20  $\mu$ l (50 ppm)

## 01 029 Rubicines - Chemotherapeutics



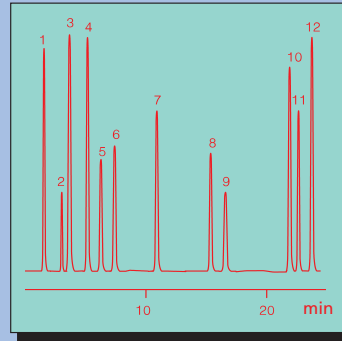
- 1) Doxorubicine
- 2) Daunorubicine

Column phase: GROM-SIL 120 ODS-3 CP, 5  $\mu$ m  
 Column size: 125 x 3mm  
 Eluent A: 25 mM Na-phosphate, pH 2.2  
 B: ACN  
 Gradient: 0-60% B (0-12 min), 60% B (12-20 min)  
 Flow rate: 0.45 ml/min  
 Pressure: 19 MPa  
 Temperature: 28°C  
 Detection (Fluor): 480 nm (exc.), 560 nm (em.)  
 Injection: 100  $\mu$ l (100 ng/ml human plasma)

**01 030 a Seditatives - Benzodiazepins**

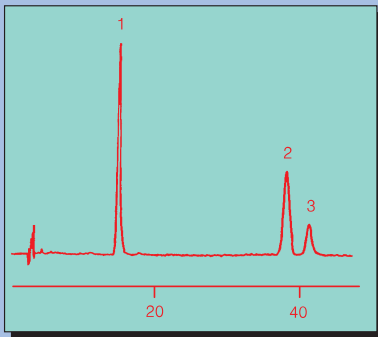
- 1) Benzyl alcohol
- 2) Clonazepam
- 3) Diazepam

Column phase: GROM-SIL 100 ODS-2 FE, 5 µm  
 Column size: 250 x 4 mm  
 Eluent: ACN / 0.1% TFA in H<sub>2</sub>O = 35 / 65  
 Flow rate: 1.1 ml/min  
 Pressure: 13 MPa  
 Temperature: RT  
 Detection (UV): 254 nm  
 Injection: 2 µl (100 µg/ml)

**01 033 Biological Amines, Catecholamines and Amino Acids**

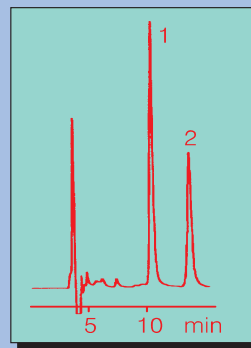
- 1) Noradrenaline
- 2) Adrenaline
- 3) D,L-3,4-Dihydroxymandelic acid
- 4) D,L-3,4-Dihydroxyphenylalanine
- 5) Dopamine
- 6) Tyrosine
- 7) D,L-4-Hydroxy-3-methoxymandelic acid
- 8) Phenylalanine
- 9) 4-Hydroxy-3-methoxyphenylglycol
- 10) 5-Hydroxyindole-3-acetic acid
- 11) Vanillic acid
- 12) Homovanillic acid

Column phase: GROM-SIL 120 ODS-4 HE, 5 µm  
 Column size: 250 x 4 mm  
 Eluent A: 100 mM Na-phosphate, pH 3.0  
 B: ACN  
 Gradient: 1% B (20 min), 15% B (15 min) - stepwise  
 Flow rate: 1.1 ml/min  
 Temperature: RT  
 Detection (UV): 210 nm, 0.64 AUFS  
 Injection: 10 µl (70 -200 µg/ml in 20 mM HCl)

**01 031 a Nonsteroid Antiinflammatory Drugs**

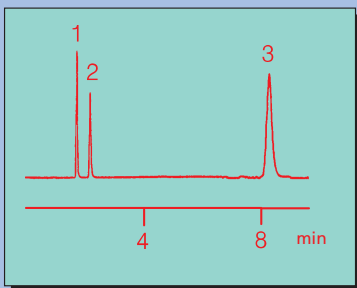
- 1) Ketoprofen
- 2) Diclofenac
- 3) Ibuprofen

Column phase: GROM-SIL 100 ODS-2 FE, 5 µm  
 Column size: 250 x 4 mm  
 Eluent: ACN / 0.1% TFA in H<sub>2</sub>O = 35 / 65  
 Flow rate: 0.8 ml/min  
 Pressure: 12 MPa  
 Temperature: RT  
 Detection (UV): 254 nm  
 Injection: 2 µl (100 µg/ml)

**06 034 Neuroleptics**

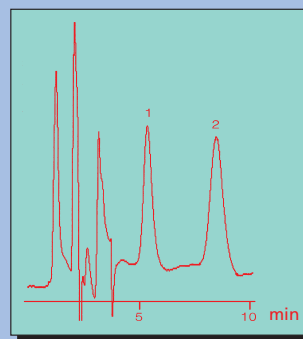
- 1) Chlorpromazine
- 2) Promazine

Column phase: GROM-SIL 120 CN-3 CP, 5 µm  
 Column size: 50 x 4 mm  
 Eluent: 0.1 M Na-acetate, pH 5.0 / ACN = 36 / 64  
 Flow rate: 0.75 ml/min  
 Pressure: 14 MPa  
 Temperature: RT  
 Detection: electrochemical, 850 mV  
 Injection: 100 µl (250, resp. 100 ng/ml) rabbit plasma

**01 032 a Analgesics / Antipyretics - HPLC Analysis of a Pill**

- 1) Paracetamol
- 2) Caffeine
- 3) Acetylsalicylic acid

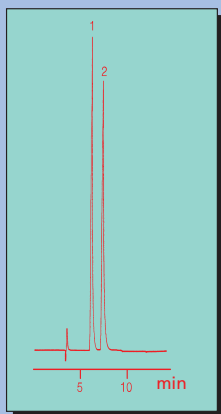
Column phase: GROM-SIL 100 ODS-2 FE, 5 µm  
 Column size: 125 x 4,6 mm  
 Eluent: ACN / 0.1% TFA in H<sub>2</sub>O = 15 / 85  
 Flow rate: 1.1 ml/min  
 Pressure: 13 MPa  
 Temperature: RT  
 Detection (UV): 274 nm, after 3 min 227 nm  
 Injection: 0.5 µl (0.5 - 2 mg/ml)

**01 035 Antibiotics**

- 1) Aureomycine
- 2) Doxycycline

Column phase: GROM-SIL 120 ODS-3 CP, 5 µm  
 Column size: 125 x 4 mm  
 Eluent: 10 mM oxalic acid / ACN = 75 / 25  
 Flow rate: 0.75 ml/min  
 Pressure: 7 MPa  
 Temperature: 28°C  
 Detection (UV): 340 nm  
 Injection: 100 µl (50 µg/ml) human plasma

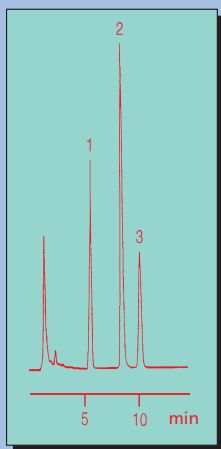
## 03 038 Fullerenes



- 1) Buckminsterfullerene (C<sub>60</sub>)
- 2) (5,6)-Fullerene (C<sub>70</sub>)

**Column phase:** GROM-SIL 120 Phenyl-1 FE, 5 μm  
**Column size:** 150 x 4 mm  
**Eluent:** n-hexane / 2-propanol = 50 / 50  
**Flow rate:** 0.4 ml/min  
**Pressure:** 3 MPa  
**Temperature:** 25°C  
**Detection (UV):** 350 nm, 0.08 AUFS  
**Injection:** 5 μl (120 μg/ml)

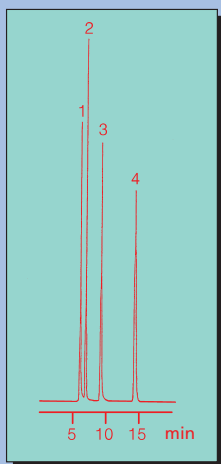
## 03 039 Analysis of Aspartame in Soft Drinks



- 1) Benzoic acid
- 2) Caffeine
- 3) Aspartame

**Column phase:** GROM-SIL 120 Phenyl-1 FE, 5 μm  
**Column size:** 150 x 4 mm  
**Eluent:** 50 mM KH<sub>2</sub>PO<sub>4</sub> / ACN / MeOH = 84 / 3 / 13  
**Flow rate:** 1.1 ml/min  
**Pressure:** 12 MPa  
**Temperature:** 30°C  
**Detection (UV):** 214 nm, 0.64 AUFS  
**Injection:** 10 μl

## 03 040 Analysis of Polyphenols II



- 1) Pyrogallol
- 2) Hydroquinone
- 3) Catechol
- 4) Phenol

**Column phase:** GROM-SIL 120 Phenyl-1 FE, 5 μm  
**Column size:** 250 x 4 mm  
**Eluent:** 5 mM acetic acid  
**Flow rate:** 0.8 ml/min  
**Pressure:** 9.5 MPa  
**Temperature:** 25°C  
**Detection (UV):** 280 nm, 0.32 AUFS  
**Injection:** 20 μl (4-7 μg, each)

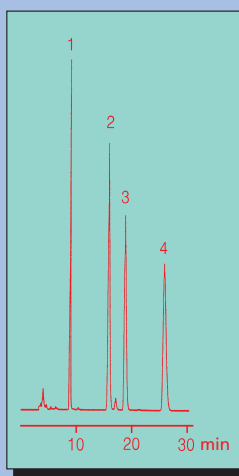
## 04 041 2,4-Dinitrophenylhydrazone Derivatives of Aldehydes and Ketones



- 1) Formaldehyde-2,4-DPNH
- 2) Acetaldehyde-2,4-DPNH
- 3) Acetone-2,4-DPNH
- 4) Acrolein-2,4-DPNH
- 5) Propionaldehyde-2,4-DPNH
- 6) Crotonaldehyde-2,4-DPNH
- 7) Methylethylketone-2,4-DPNH
- 8) Isobutyraldehyde-2,4-DPNH
- 9) Benzaldehyde-2,4-DPNH
- 10) n-Valeraldehyde-2,4-DPNH
- 11) Toluvaldehyde-2,4-DPNH
- 12) Capronaldehyde-2,4-DPNH

**Column phase:** GROM-SIL 120 Butyl-1 ST, 5 μm  
**Column size:** 150 x 4 mm  
**Eluent A:** H<sub>2</sub>O / THF = 90 / 10  
**B:** ACN  
**Gradient:** 35% B (0-7 min), 35-65% B (7-18 min), 65-100% B (18-20 min)  
**Flow rate:** 1.1 ml/min  
**Pressure:** 8 MPa  
**Temperature:** 30°C  
**Detection (Vis):** 360 nm, 0.01 AUFS  
**Injection:** 10 μl (25-30 μg/ml)

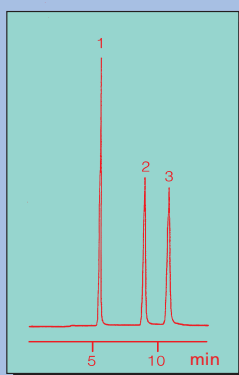
## 07 042 Analysis of Tocopherols



- 1) a-Tocopherol
- 2) b-Tocopherol
- 3) g-Tocopherol
- 4) d-Tocopherol

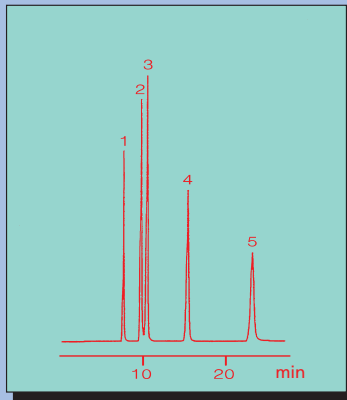
**Column phase:** GROM-SIL 120 Amino-2 PA, 5 μm  
**Column size:** 250 x 4 mm  
**Eluent:** hexane / ethyl acetate = 70 / 30  
**Flow rate:** 0.8 ml/min  
**Pressure:** 2 MPa  
**Temperature:** 30°C  
**Detection (UV):** 295 nm, 0.08 AUFS  
**Injection:** 7 μl (250 μg/ml, each)

## 07 043 Analysis of Water-Soluble Vitamins



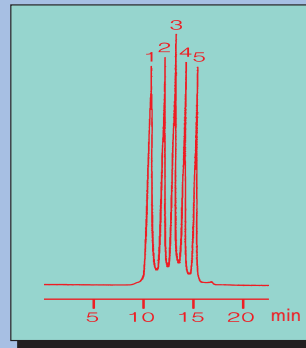
- 1) Nicotinic acid
- 2) Isoascorbic acid
- 3) L-Ascorbic acid

**Column phase:** GROM-SIL 120 Amino 2 PA, 5 μm  
**Column size:** 250 x 4 mm  
**Eluent:** 50 mM NH<sub>4</sub>H<sub>2</sub>PO<sub>4</sub> / ACN = 30 / 70  
**Flow rate:** 0.8 ml/min  
**Pressure:** 5 MPa  
**Temperature:** 40°C  
**Detection (UV):** 250 nm, 0.16 AUFS  
**Injection:** 10 μl (50-100 μg/ml)

**07 044 Separation of Nucleotides by HPLC**

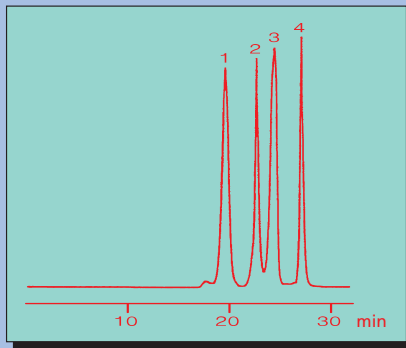
- 1) 5'-CMP
- 2) 5'-AMP
- 3) 5'-UMP
- 4) 5'-IMP
- 5) 5'-GMP

Column phase: GROM-SIL 120 Amino-2 PA, 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent: 50 mM  $\text{KH}_2\text{PO}_4$ , pH 3.5  
 Flow rate: 0.8 ml/min  
 Pressure: 6 MPa  
 Temperature: 30°C  
 Detection (UV): 260 nm, 0.16 AUFS  
 Injection: 10  $\mu$ l (50 -100  $\mu$ g/ml)

**09 046 a Steric Exclusion Chromatography of Proteins - I**

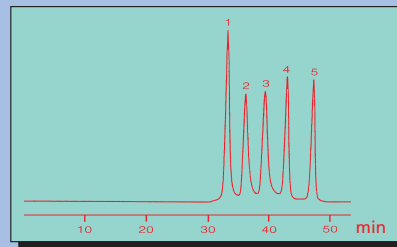
- 1) Glutamate dehydrogenase (MW 290,000)
- 2) Lactate dehydrogenase (MW 142,000)
- 3) Enolase (MW 67,000)
- 4) Adenylate kinase (MW 32,000)
- 5) Cytochrome C (MW 12,000)

Column phase: GROM-SIL 120 SEC, 5  $\mu$ m  
 Column size: 500 x 8 mm  
 Eluent: 0.1 M K-phosphate, 0.2 M NaCl, pH 7.0 / ACN = 70 / 30  
 Flow rate: 0.7 ml/min  
 Pressure: 4.5 MPa  
 Temperature: 26°C  
 Detection (UV): 280 nm, 0.08 AUFS  
 Injection: 15  $\mu$ l (~10 mg/ml, each)

**09 045 a Steric Exclusion Chromatography of Peptides - I**

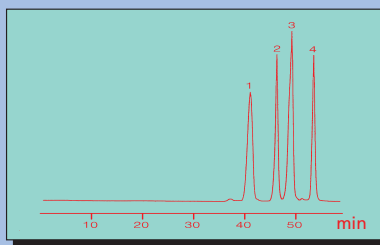
- 1) Insulin (Bovine)
- 2) Neurotensin
- 3) Angiotensin-II
- 4) Glycine

Column phase: GROM-SIL 60 SEC, 5  $\mu$ m  
 Column size: 500 x 8 mm  
 Eluent: 0.1 M K-phosphate, 0.2 M NaCl, pH 7.0 / ACN = 70 / 30  
 Flow rate: 0.7 ml/min  
 Pressure: 6 MPa  
 Temperature: 25°C  
 Detection (UV): 215 nm, 0.16 AUFS  
 Injection: 25  $\mu$ l (0.07- 5.3 mg/ml)

**09 046 b Steric Exclusion Chromatography of Proteins - II**

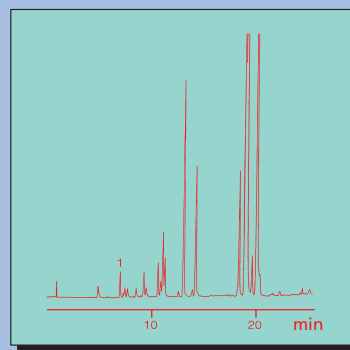
- 1) Glutamate dehydrogenase (MW 290,000)
- 2) Lactate dehydrogenase (MW 142,000)
- 3) Enolase (MW 67,000)
- 4) Adenylate kinase (MW 32,000)
- 5) Cytochrome C (MW 12,000)

Column phase: GROM-SIL 200 SEC, 5  $\mu$ m  
 Column size: 500 x 8 mm  
 Eluent: 0.1 M K-phosphate, 0.2 M NaCl, pH 7.0 / ACN = 70 / 30  
 Flow rate: 0.7 ml/min  
 Pressure: 5.2 MPa  
 Temperature: 26°C  
 Detection (UV): 280 nm, 0.08 AUFS  
 Injection: 15  $\mu$ l (~10 mg/ml, each)

**09 045 b Steric Exclusion Chromatography of Peptides - II**

- 1) Insulin (Bovine)
- 2) Neurotensin
- 3) Angiotensin-II
- 4) Glycine

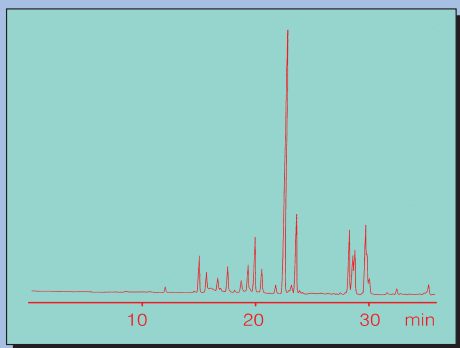
Column phase: GROM-SIL 120 SEC, 5  $\mu$ m  
 Column size: 500 x 8 mm  
 Eluent: 0.1 M K-phosphate, 0.2 M NaCl, pH 7.0 / ACN = 70 / 30  
 Flow rate: 0.7 ml/min  
 Pressure: 5 MPa  
 Temperature: 25°C  
 Detection (UV): 215 nm, 0.16 AUFS  
 Injection: 25  $\mu$ l (0.07- 5.3 mg/ml)

**01 047 Limonene in Grapefruit Oil**

- 1) Limonene

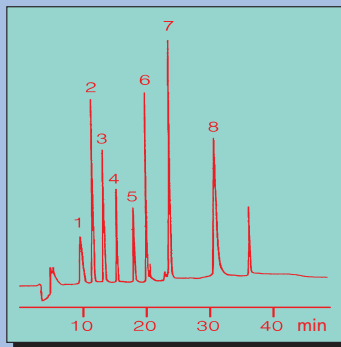
Column phase: GROM-SIL 80 ODS-2 FE, 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent A:  $\text{H}_2\text{O}$  / MeOH = 50 / 50  
 B: ACN  
 Gradient: 0 - 100% B (0-20 min)  
 Flow rate: 0.8 ml/min  
 Pressure: 16 MPa  
 Temperature: RT  
 Detection (UV): 254 nm, 1.0 AUFS  
 Injection: 2  $\mu$ l oil

### 01 048 Analysis of Grapefruit Oil by HPLC - fingerprint



Column phase: GROM-SIL 100 ODS-2 FE, 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent A: H<sub>2</sub>O  
 B: ACN  
 Gradient: 25 - 100% B (0-30 min)  
 Flow rate: 0.8 ml/min  
 Pressure: 17 MPa  
 Temperature: RT  
 Detection (UV): 254 nm, 1.0 AUFS  
 Injection: 2  $\mu$ l oil

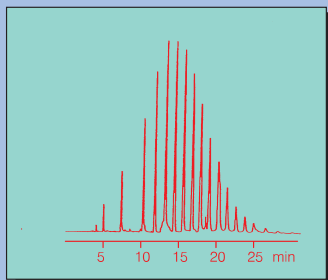
### 02 051 Separation of Peptides and Proteins



- 1) Bradykinin
- 2) Met-Enkephalin
- 3) Angiotensin I
- 4) Leu-Enkephalin
- 5) Substance-P
- 6) Insulin
- 7) Lysozyme
- 8) Myoglobin

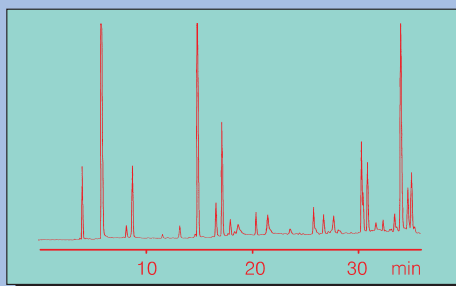
Column phase: GROM-SIL 120 Octyl-6 MB, 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent A: 0.1% TFA  
 B: ACN  
 Gradient: 20-50% B (0-30 min)  
 Flow rate: 0.8 ml/min  
 Pressure: 12 MPa  
 Temperature: RT  
 Detection (UV): 200 nm  
 Injection: 10  $\mu$ l

### 08 049 Nonylphenylethoxylates - Nonionic Surfactants



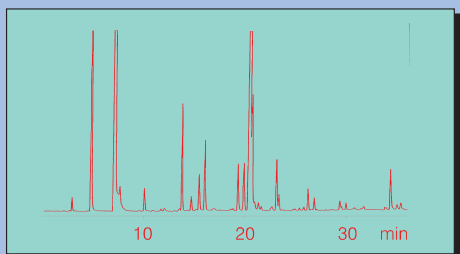
Column phase: GROM-SIL 100 Norm Ph-1 ST, 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent A: H<sub>2</sub>O / ethyl acetate = 1 / 99  
 B: H<sub>2</sub>O / THF = 5 / 95  
 Gradient: 0 - 50% B (0-20 min)  
 Flow rate: 0.8 ml/min  
 Pressure: 16 MPa  
 Temperature: RT  
 Detection (UV): 254 nm  
 Injection: 2  $\mu$ l nonylphenol-10-EO

### 01 052 Rosenta Analysis by HPLC



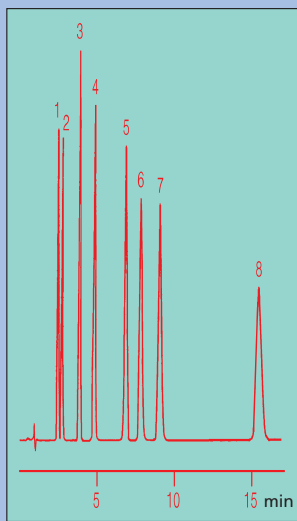
Column phase: GROM-SIL 100 ODS-2 FE, 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent A: water  
 B: acetonitrile  
 Gradient: 25 - 100% B (0-30 min)  
 Flow rate: 0.8 ml/min  
 Pressure: 17 MPa  
 Temperature: RT  
 Detection (UV): 254 nm, 1.0 AUFS  
 Injection: 1  $\mu$ l rosenta

### 01 050 Rose Essence - HPLC fingerprint



Column phase: GROM-SIL 100 ODS-2 FE, 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent A: water  
 B: acetonitrile  
 Gradient: 25 - 100% B (0-30 min, linear)  
 Flow rate: 0.8 ml/min  
 Pressure: 17 MPa  
 Temperature: RT  
 Detection (UV): 254 nm, 1.0 AUFS  
 Injection: 1  $\mu$ l essence

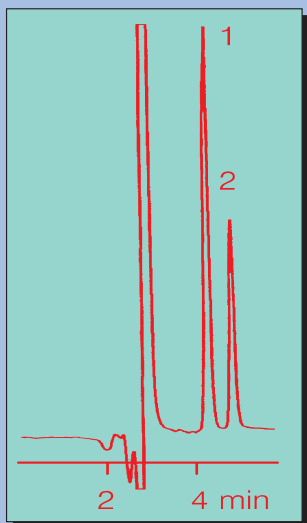
### 01 072 Alcohols, Aldehydes, Ketones



- 1) Benzyl alcohol
- 2) 2-Phenoxyethanol
- 3) Anisaldehyde
- 4) Acetophenone
- 5) p-Tolualdehyde
- 6) p-Methylacetophenone
- 7) Anisole
- 8) Phenetole

Column phase: GROM-SIL 100 ODS-0 AB, 5  $\mu$ m  
 Column size: 125 x 4 mm  
 Eluent: H<sub>2</sub>O / ACN = 60 / 40  
 Flow rate: 0.5 ml/min  
 Pressure: 8 MPa  
 Temperature: RT  
 Detection (UV): 254 nm  
 Injection: 10  $\mu$ l

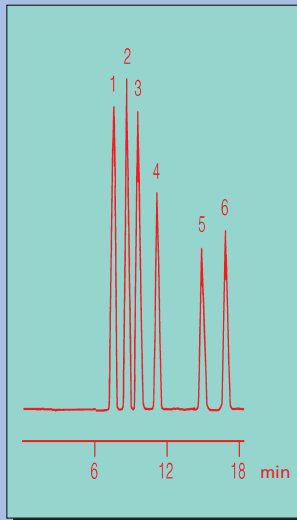
### 01 073 Determination of $\beta$ -Blockers in Human Plasma



- 1) N-Hydroxymethylatenolol
- 2) Atenolol

**Column phase:**  
GROM-SIL 100 ODS-2 FE, 5  $\mu$ m  
**Column size:**  
125 x 4 mm  
**Eluent:**  
50 mM  $\text{KH}_2\text{PO}_4$ , pH 2.2 /  
ACN = 81 / 19  
**Flow rate:**  
0.75 ml/min  
**Pressure:**  
14 MPa  
**Temperature:**  
RT  
**Detection (Fluor.):**  
265 nm (exc.), 295 nm (em.)  
**Injection:**  
1  $\mu$ l human plasma  
(~ 500 fmol)

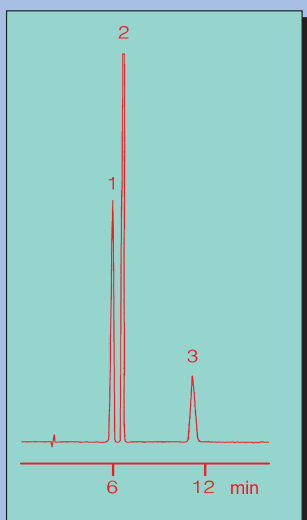
### 08 076 Analysis of Trinitrotoluene Isomers



- 1) 2, 4, 6 - TNT
- 2) 2, 3, 6 - TNT
- 3) 2, 3, 5 - TNT
- 4) 2, 4, 5 - TNT
- 5) 2, 3, 4 - TNT
- 6) 3, 4, 5 - TNT

**Column phase:**  
GROM-SIL 100 Normal PH-1 ST,  
3  $\mu$ m  
**Column size:**  
125 x 4 mm  
**Eluent:**  
n-hexane / methylene chloride =  
87.5 / 12.5  
**Flow rate:**  
0.6 ml/min  
**Pressure:**  
18 MPa  
**Temperature:**  
RT  
**Detection (UV):**  
254 nm  
**Injection:**  
10  $\mu$ l

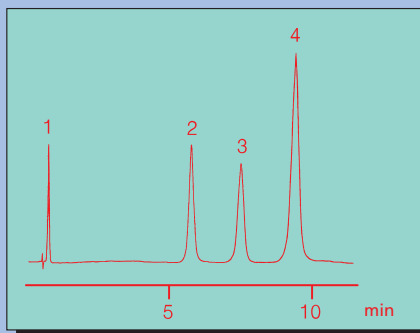
### 01 074 Sweeteners in beverages



- 1) Sorbic acid
- 2) Benzoic acid
- 3) Saccharin

**Column phase:**  
GROM-SIL 100 ODS-2 FE, 5  $\mu$ m  
**Column size:**  
125 x 3 mm  
**Eluent:**  
12 mM TBAH, 0.2 M Na-phosphate,  
pH 3.6 /  $\text{H}_2\text{O}$  / ACN = 32 / 60 / 8  
**Flow rate:**  
0.4 ml/min  
**Pressure:**  
12 MPa  
**Temperature:**  
RT  
**Detection (UV):**  
230 nm  
**Injection:**  
20  $\mu$ l (50  $\mu$ g/ml)

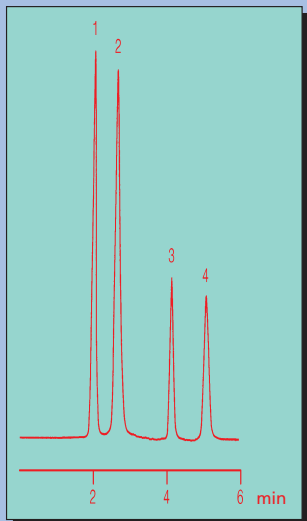
### 01 077 Analysis of Pesticides - Organochlorines



- 1) Dieldrin
- 2) Heptachlor
- 3) DDT
- 4) Aldrin

**Column phase:** GROM-SIL 100 ODS-2 FE, 3  $\mu$ m  
**Column size:** 125 x 4 mm  
**Eluent:**  $\text{H}_2\text{O}$  / MeOH = 20 / 80  
**Flow rate:** 1.5 ml/min  
**Pressure:** 20 MPa  
**Temperature:** RT  
**Detection (UV):** 220 nm, 0.04 AUFs  
**Injection:** 10  $\mu$ l (2-4  $\mu$ g, each)

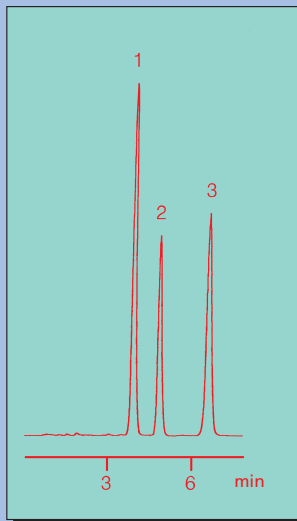
### 01 075 Analysis of Aflatoxins by HPLC



- 1)  $\text{G}_2\text{a}$
- 2)  $\text{B}_2\text{a}$
- 3)  $\text{G}_2$
- 4)  $\text{B}_2$

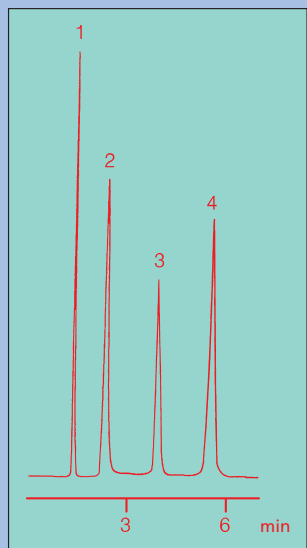
**Column phase:**  
GROM-SIL 100 ODS-0 AB, 5  $\mu$ m  
**Column size:**  
125 x 4mm  
**Eluent:**  
acetic acid / MeOH /  $\text{H}_2\text{O}$  = 2 / 2 / 8  
**Flow rate:**  
0.6 ml/min  
**Pressure:**  
7 MPa  
**Temperature:**  
RT  
**Detection (Fluor.):**  
360 nm (exc.), 425 nm (em.)  
**Injection:** 10  $\mu$ l (100  $\mu$ g/ml)

### 01 078 Analysis of Pesticides - Organophosphates



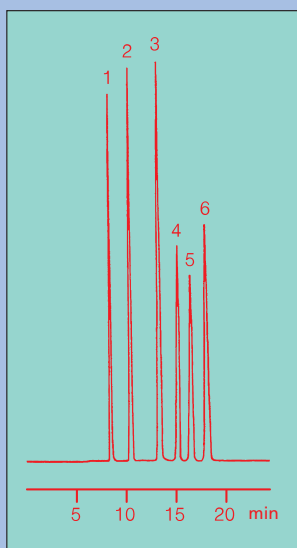
- 1) Methylparathion
- 2) Malathion
- 3) Ethylparathion

**Column phase:**  
GROM-SIL 100 ODS-2 FE, 3  $\mu$ m  
**Column size:**  
125 x 4mm  
**Eluent:**  
 $\text{H}_2\text{O}$  / MeOH = 20 / 80  
**Flow rate:**  
1.5 ml/min  
**Pressure:**  
20 MPa  
**Temperature:**  
RT  
**Detection (UV):**  
220 nm, 0.04 AUFs  
**Injection:**  
10  $\mu$ l (2-4  $\mu$ g, each)

**01 080 HPLC Separation of Phenolic Acids**

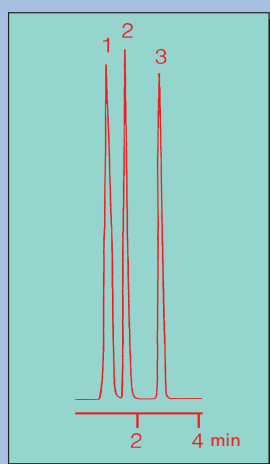
- 1) Gallic acid
- 2) p-Hydroxybenzoic acid
- 3) o-Hydroxyphenyl acetic acid
- 4) Ferulic acid

**Column phase:**  
GROM-SIL 120 ODS-4 HE, 5  $\mu$ m  
**Column size:**  
125 x 4 mm  
**Eluent:**  
1% triethylammonium acetate  
pH 4.0 / ACN = 15 / 85  
**Flow rate:**  
1.5 ml/min  
**Pressure:**  
19 MPa  
**Temperature:**  
RT  
**Detection (UV):**  
254 nm, 0.08 AUFS  
**Injection:**  
10  $\mu$ l (1-5  $\mu$ g each)

**06 087 Normal Phase Separation of Steroids**

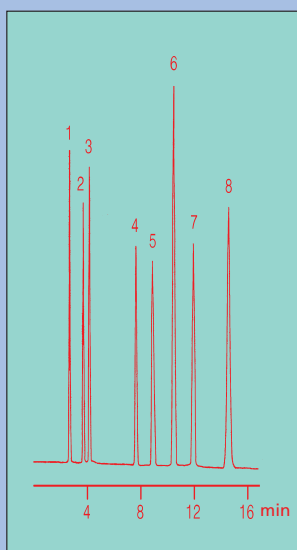
- 1) Progesterone
- 2) Deoxycorticosterone
- 3) Corticosterone
- 4) Cortisone
- 5) Prednisone,
- 6) Prednisolone

**Column phase:**  
GROM-SIL 120 Cyan-1 ST, 5  $\mu$ m  
**Column size:**  
250 x 4 mm  
**Eluent:**  
hexane / methylene chloride /  
2-propanol = 100 / 10 / 2  
**Flow rate:**  
0.4 ml/min  
**Pressure:**  
6 MPa  
**Temperature:**  
21°C  
**Detection (UV):**  
254 nm  
**Injection:**  
10  $\mu$ l (~25  $\mu$ g, each)

**01 081 Analysis of Food Preservatives**

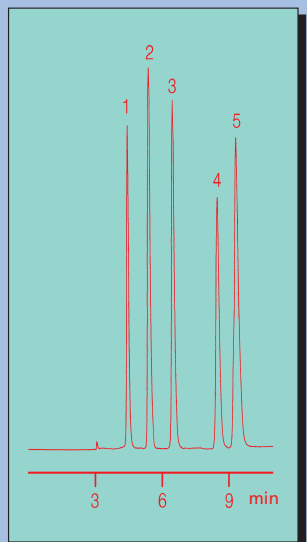
- 1) p-Hydroxybenzoic acid
- 2) Methylhydroxybenzoic acid
- 3) Propylhydroxybenzoic acid

**Column phase:**  
GROM-SIL 120 ODS-3 CP, 5  $\mu$ m  
**Column size:**  
125 x 4 mm  
**Eluent:**  
H<sub>2</sub>O / ACN = 50 / 50 (v/v)  
**Flow rate:**  
1.5 ml/min  
**Pressure:**  
15 MPa  
**Temperature:**  
RT  
**Detection (UV):**  
254 nm, 0.1 AUFS  
**Injection:**  
10  $\mu$ l (~4  $\mu$ g each)

**01 088 HPLC Analysis of Cough/ Cold Preparations**

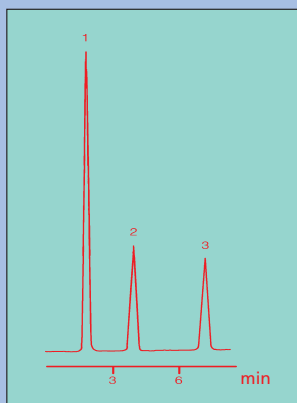
- 1) Potassium gulacol sulfonate
- 2) Acetaminophen
- 3) Caffeine
- 4) Salicylamide
- 5) Maleic acid chlorophenylamine
- 6) Phenol
- 7) Aspirin
- 8) Ethenzamide

**Column phase:**  
GROM-SIL 120 ODS-3 CP, 5  $\mu$ m  
**Column size:**  
250 x 4 mm  
**Eluent:**  
0.05 M NaH<sub>2</sub>PO<sub>4</sub> pH 2.5 /  
ACN = 20 / 80  
**Flow rate:**  
0.8 ml/min  
**Pressure:**  
9 MPa  
**Temperature:**  
40°C  
**Detection (UV):**  
280 nm  
**Injection:** 5  $\mu$ l (150 - 600  $\mu$ l/ml)

**01 086 Analysis of Broncholytics - Xanthines - by HPLC**

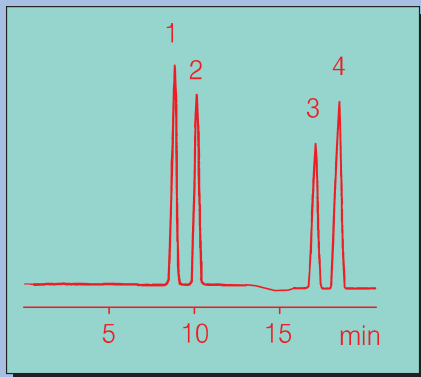
- 1) Theobromine
- 2) Theophylline
- 3)  $\beta$ -Hydroxyethyltheophylline
- 4) 7- $\beta$ -Hydroxypropyltheophylline
- 5) Caffeine

**Column phase:**  
GROM-SIL 120 ODS-4 HE, 5  $\mu$ m  
**Column size:**  
250 x 4 mm  
**Eluent:**  
0.4% Na-acetate /  
ACN = 85 / 15  
**Flow rate:**  
0.8 ml/min  
**Pressure:**  
16 MPa  
**Temperature:**  
RT  
**Detection (UV):**  
254 nm, 0.01 AUFS  
**Injection:**  
10  $\mu$ l (10  $\mu$ g, each)

**02 089 HPLC of Cardiac Glycosides**

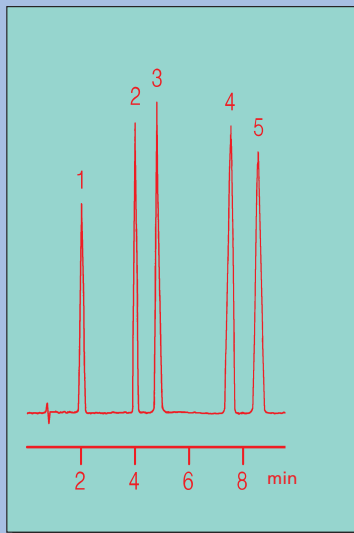
- 1) Esculin
- 2) Strophanthin G
- 3) Digitoxin

**Column phase:**  
GROM-SIL 120 Octyl-5 CP, 5  $\mu$ m  
**Column size:**  
250 x 4 mm  
**Eluent:**  
water / acetonitrile = 60 / 40  
**Flow rate:**  
2.3 ml/min  
**Pressure:**  
15 MPa  
**Temperature:**  
RT  
**Detection (UV):**  
220 nm, 0.04 AUFS  
**Injection:**  
10  $\mu$ l (50  $\mu$ g/ml, each)

**01 090 HPLC Analysis of Corticosteroids**

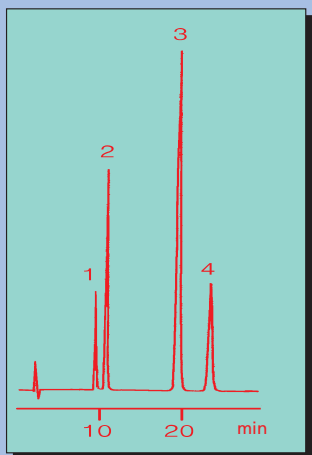
- 1) Cortisone
- 2) Hydrocortisone
- 3) Corticosterone,
- 4) Cortisone acetate

**Column phase:** GROM-SIL 120 ODS-4 HE, 5  $\mu$ m  
**Column size:** 250 x 4 mm  
**Eluent:** water / methanol = 40 / 60  
**Flow rate:** 0.8 ml/min  
**Pressure:** 20 MPa  
**Temperature:** 21°C  
**Detection (UV):** 230 nm, 0.02 AUFS  
**Injection:** 10  $\mu$ l (~10  $\mu$ g/ml, each)

**01 093 Analysis of Anticonvulsant Drugs**

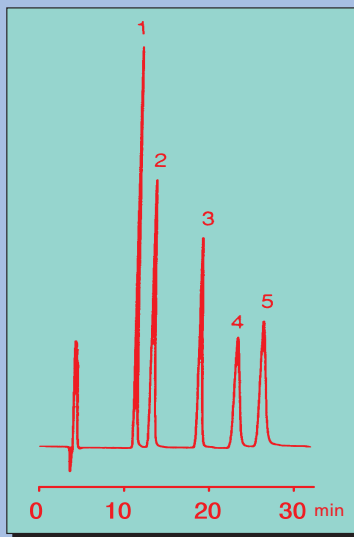
- 1) Primidone
- 2) Phenobarbitone
- 3) Butobarbitone
- 4) Carbamazepine
- 5) Phenytoin

**Column phase:** GROM-SIL 120 ODS-4 HE, 3  $\mu$ m  
**Column size:** 125 x 4 mm  
**Eluent:** 5 mM Na-phosphate, pH 5.6 / ACN = 70 / 30  
**Flow rate:** 0.8 ml/min  
**Pressure:** 10 MPa  
**Temperature:** RT  
**Detection (UV):** 210 nm  
**Injection:** 10  $\mu$ l (20 - 50  $\mu$ g, each)

**01 091 Analysis of Anti-inflammatory Drugs**

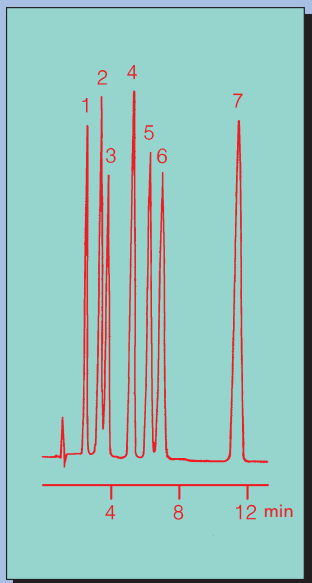
- 1) Isopropylmethylphenol
- 2) Lidocaine
- 3) Diphenhydramine
- 4) Hexanophenone

**Column phase:** GROM-SIL 120 ODS-3 CP, 5  $\mu$ m  
**Column size:** 250 x 4 mm  
**Eluent:** 5 mM SDS, pH 2.2 (with H<sub>3</sub>PO<sub>4</sub>) / ACN = 50 / 50  
**Flow rate:** 0.8 ml/min  
**Pressure:** 10 MPa  
**Temperature:** 40°C  
**Detection (UV):** 230 nm, 0.32 AUFS  
**Injection:** 20  $\mu$ l (4 - 40  $\mu$ g/ml)

**07 094 Oligosaccharide Analysis**

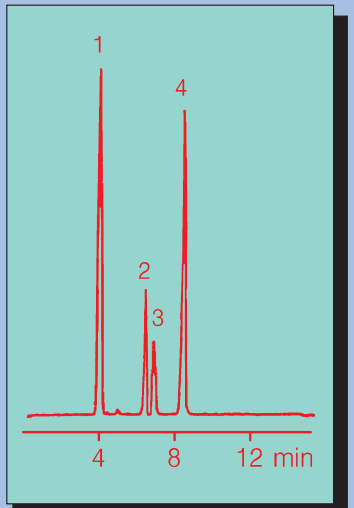
- 1) Fructose
- 2) Glucose
- 3) Saccharose
- 4) Maltose
- 5) Lactose

**Column phase:** GROM-SIL 120 Amino-2 PA, 5  $\mu$ m  
**Column size:** 250 x 4 mm  
**Eluent:** H<sub>2</sub>O / ACN = 25 / 75  
**Flow rate:** 0.8 ml/min  
**Pressure:** 13 MPa  
**Temperature:** 21°C  
**Detection:** RI  
**Injection:** 20  $\mu$ l

**01 092 Steroid Separation by HPLC**

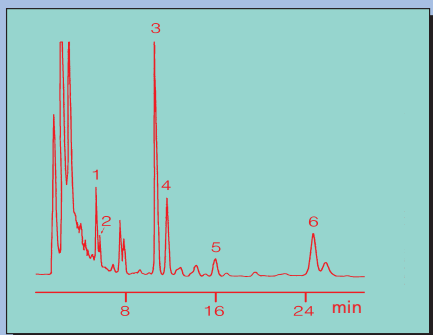
- 1) Prednisolone
- 2) Fluocinolone acetonide
- 3) Hydrocortisone acetate
- 4) Dexamethasone acetate
- 5) Hydrocortisone butylate
- 6) Fluocinonide
- 7) Clobetazol propionate

**Column phase:** GROM-SIL 120 ODS-3 CP, 5  $\mu$ m  
**Column size:** 250 x 4 mm  
**Eluent:** H<sub>2</sub>O / MeOH / ACN = 10 / 40 / 23  
**Flow rate:** 0.8 ml/min  
**Pressure:** 11 MPa  
**Temperature:** 21°C  
**Detection (UV):** 243 nm  
**Injection:** 10  $\mu$ l

**08 095 Analysis of Retinoids by HPLC**

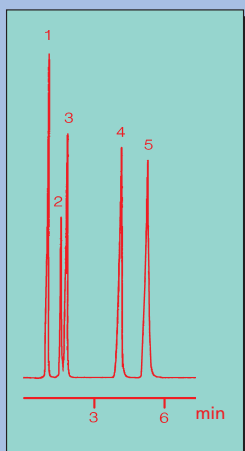
- 1) Vitamin A palmitate
- 2) 13-cis-Retinoic acid
- 3) all-trans Retinoic acid
- 4) Acitretin

**Column phase:** GROM-SIL 120 Norm Ph-3 PV, 5  $\mu$ m  
**Column size:** 250 x 4 mm  
**Eluent:** hexane / THF / acetic acid = 90 / 10 / 0.01  
**Flow rate:** 1.2 ml/min  
**Pressure:** 12 MPa  
**Temperature:** RT  
**Detection (VIS):** 365 nm  
**Injection:** 20  $\mu$ l

**01 096 HPLC Analysis of Saikosides**

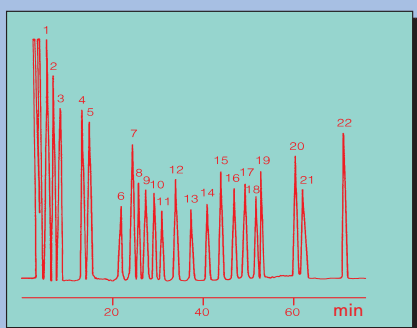
- 1) Saikosaponin c
- 2) Saikosaponin f
- 3) Saikosaponin a
- 4) Saikosaponin b2
- 5) Saikosaponin b1
- 6) Saikosaponin d

Column phase: GROM-SIL 120 ODS-3 CP, 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent: H<sub>2</sub>O / MeOH / ACN = 45 / 15 / 40  
 Flow rate: 0.8 ml/min  
 Pressure: 8 MPa  
 Temperature: 40°C  
 Detection (UV): 210 nm  
 Injection: 5  $\mu$ l (~30  $\mu$ g of each)

**01 097 HPLC of Quinones**

- 1) p-Benzoquinone
- 2) 2,5-Dimethylbenzoquinone
- 3) 1,4-Naphthoquinone
- 4) Duroquinone
- 5) Anthraquinone

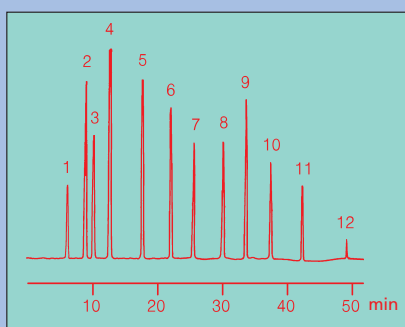
Column phase: GROM-SIL 120 ODS-4 HE, 3  $\mu$ m  
 Column size: 125 x 4 mm  
 Eluent: 20 mM KH<sub>2</sub>PO<sub>4</sub>, pH 2.0 / ACN = 50 / 50  
 Flow rate: 1.1 ml/min  
 Pressure: 19 MPa  
 Temperature: 21°C  
 Detection (UV): 254 nm, 0.10 AUFS  
 Injection: 10  $\mu$ l (1 - 5  $\mu$ g, each)

**01 098 Analysis of Phenacyl Derivatives of Fatty Acids in Blood by HPLC**

- |          |             |
|----------|-------------|
| 1) 6:0   | 12) 15:0    |
| 2) 8:0   | 13) 18:2 tt |
| 3) 10:0  | 14) 20:3    |
| 4) 12:0  | 15) 16:0    |
| 5) 14:1  | 16) 18:1 c  |
| 6) 18:3  | 17) 18:1 t  |
| 7) 14:0  | 18) 20:2    |
| 8) 22:6  | 19) 17:0    |
| 9) 16:1  | 20) 18:0    |
| 10) 20:4 | 21) 20:1    |
| 11) 18:2 | 22) 22:1    |

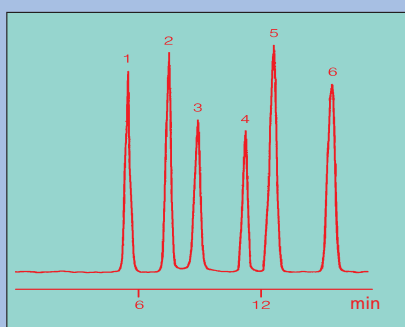
number of carbons :  
 number of double bonds; c = cis-,  
 t = trans position -

Column phase: GROM-SIL 100 ODS-0 AB, 3  $\mu$ m + guard column  
 Column size: 250 x 4 mm  
 Eluent: A: MeOH  
 B: ACN  
 C: H<sub>2</sub>O  
 Gradient: 40% A + 40.5% B + 19.5% C (0 min), 80.5% A + 19.5% C (0-25 min), 90% A + 10% C (25-60 min), 100% A (60-70 min)  
 Flow rate: 1.0 ml/min  
 Pressure: 16 MPa  
 Temperature: 40°C  
 Detection (UV): 242 nm  
 Injection: 10  $\mu$ l

**01 099 Fatty Acid Analysis by HPLC - p-Bromophenacylestere of Fatty Acids**

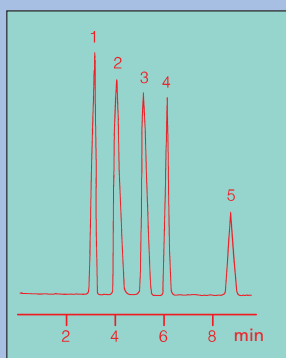
- 1) Pentanoic acid
- 2) Hexanoic acid
- 3) Heptanoic acid
- 4) Octanoic acid
- 5) Nonanoic acid
- 6) Decanoic acid
- 7) Dodecanoic acid
- 8) Tetradecanoic acid
- 9) Hexadecanoic acid
- 10) Octadecanoic acid
- 11) Eicosanoic acid
- 12) Docosanoic acid

Column phase: GROM-SIL 100 ODS-0 AB, 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent A: H<sub>3</sub>PO<sub>4</sub> / H<sub>2</sub>O / ACN = 1 / 70 / 30  
 B: ACN  
 Gradient: 0% B (0-5 min), 0-100% B (5-25 min)  
 Flow rate: 0.8 ml/min  
 Pressure: 12 MPa  
 Temperature: 30°C  
 Detection (UV): 254 nm  
 Injection: 20  $\mu$ l

**01 102 HPLC Analysis of Barbiturates**

- 1) Barbital
- 2) Phenobarbital
- 3) Butobarbital
- 4) Hexobarbital
- 5) Amobarbital
- 6) Secobarbital

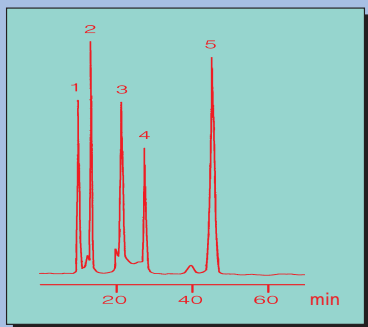
Column phase: GROM-SIL 120 ODS-5 ST, 5  $\mu$ m  
 Column size: 150 x 4 mm  
 Eluent: water / methanol = 40 / 60  
 Flow rate: 0.6 ml/min  
 Pressure: 16 MPa  
 Temperature: RT  
 Detection (UV): 230 nm, 0.01 AUFS  
 Injection: 30  $\mu$ l (30 - 50  $\mu$ g each)

**01 104 HPLC of Alkaloids**

- 1) Caffeine
- 2) Codeine
- 3) Atropine sulfate
- 4) Papaverine
- 5) Eupaverin chloride

Column phase: GROM-SIL 100 ODS-2 FE, 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent: 0.05 M KH<sub>2</sub>PO<sub>4</sub>, pH 2.8 + 0.04 M octane-1-sulfonate / MeOH = 40 / 60  
 Flow rate: 1.0 ml/min  
 Pressure: 14 MPa  
 Temperature: 21°C  
 Detection (UV): 220 nm  
 Injection: 10  $\mu$ l

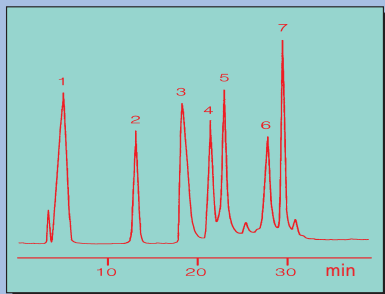
### 09 105 Separation of Proteins by Ion exchange HPLC



- 1) Trypsinogen
- 2) Ribonuclease A
- 3) Cytochrome C
- 4) Chymotrypsinogen
- 5) Lysozyme

Column phase: GROM-SIL 300 WCX, 7  $\mu$ m  
 Column size: 250 x 4.6 mm  
 Eluent A: 0.05 M  $\text{NaH}_2\text{PO}_4$ , pH 6.4  
 B: 0.5 M  $\text{NaH}_2\text{PO}_4$ , pH 6.4  
 Gradient: 0-18% B (0-21 min), 18% B (21-26 min),  
 18-60% B (26-70 min)  
 Flow rate: 1.0 ml/min  
 Pressure: 7 MPa  
 Temperature: RT  
 Detection (UV): 280 nm  
 Injection: 100  $\mu$ l

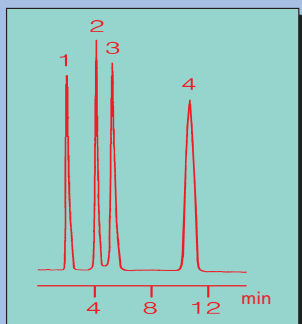
### 09 106 Hydrophobic Interaction Chromatography of Proteins



- 1) Cytochrome C
- 2) Myoglobin
- 3)  $\beta$ -Lactoglobulin
- 4) Ribonuclease A
- 5) Lysozyme
- 6)  $\alpha$ -Chymotrypsin
- 7) Chymotrypsinogen

Column phase: GROM-SIL 300 HIC, 7  $\mu$ m  
 Column size: 250 x 4.6 mm  
 Eluent A: 2.0 M  $(\text{NH}_4)_2\text{SO}_4$  - 0.1 M  $\text{KH}_2\text{PO}_4$ , pH 6.8  
 B: 0.1 M  $\text{KH}_2\text{PO}_4$ , pH 6.8  
 Gradient: 0-100% B (0-30 min)  
 Flow rate: 1.0 ml/min  
 Pressure: 8 MPa  
 Temperature: RT  
 Detection (UV): 280 nm  
 Injection: 100  $\mu$ l

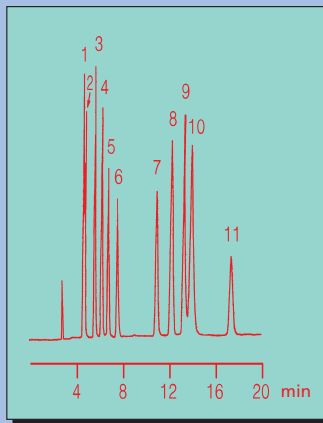
### 01 107 HPLC Separation of Antibiotics



- 1) Amoxicillin
- 2) Penicillin V
- 3) Penicillin G
- 4) Nafcillin

Column phase: GROM-SIL 100 ODS-0 AB, 5  $\mu$ m  
 Column size: 125 x 4 mm  
 Eluent: 0.1 M  $\text{NaH}_2\text{PO}_4$  / ACN = 70 / 30  
 Flow rate: 1.3 ml/min  
 Pressure: 20 MPa  
 Temperature: RT  
 Detection (UV): 220 nm, 0.02 AUFS  
 Injection: 10  $\mu$ l (2-4  $\mu$ g of each)

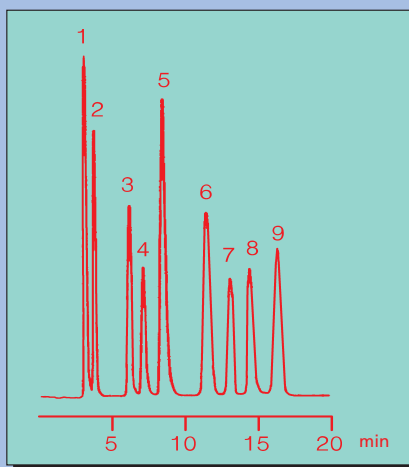
### 01 108 Analysis of UV-Absorbers



- 1) Isopropyl-p-methoxy cinnamate
- 2) 2-Hydroxy-4-methoxy benzophenone
- 3) 2-Phenylbenzimidazol-5-sulfonic acid
- 4) 2-Hydroxy-4-methoxy benzophenone-5-sulfonic acid
- 5) Isoamyl-p-methoxy cinnamate
- 6) Anthracene
- 7) Ethyl-2,4-diisopropyl cinnamate
- 8) 2-Ethylhexyl-p-(dimethyl-amino) benzoate
- 9) 2-Ethylhexyl-p-methoxy cinnamate
- 10) 1,2-(Di-p-methoxycinnamyl)-3-(2-ethylhexyl)glyceride
- 11) 3,3,5-Trimethylcyclohexyl-2-hydroxybenzoate

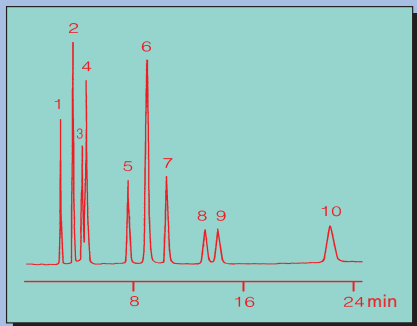
Column phase: GROM-SIL 120 ODS-3 CP, 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent: 3 mM trimethylstearylammonium chloride /  
 ACN = 15 / 85  
 Flow rate: 0.8 ml/min  
 Pressure: 12 MPa  
 Temperature: 40°C  
 Detection (UV): 280 nm  
 Injection: 5  $\mu$ l

### 01 109 Determination of Food Additives



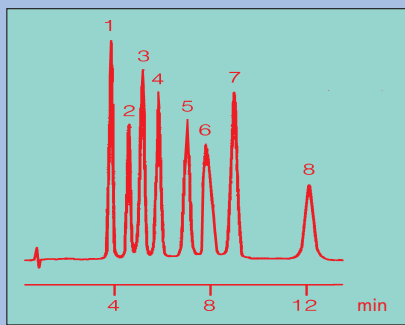
- 1) DHA
- 2) Ethyl PHBA
- 3) Isopropyl PHBA
- 4) n-Propyl PHBA
- 5) SOA
- 7) Isobutyl PHBA
- 8) n-Butyl PHBA
- 9) SA

Column phase: GROM-SIL 100 ODS-2 FE, 3  $\mu$ m  
 Column size: 100 x 4 mm  
 Eluent: 0.05 M  $\text{NaH}_2\text{PO}_4$ , pH 4.5 + 2.5 mM cetyltrimethyl-ammonium chloride / MeOH / ACN = 31 / 15 / 10  
 Flow rate: 0.8 ml/min  
 Pressure: 8 MPa  
 Temperature: 21°C  
 Detection (UV): 233 nm  
 Injection: 20  $\mu$ l

**01 110 Analysis of Preservatives**

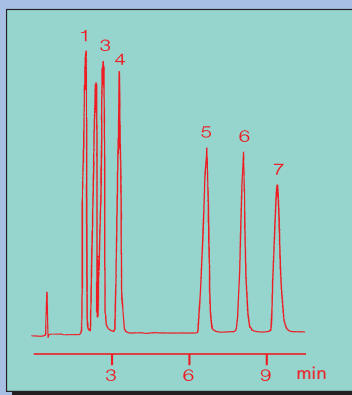
- 1) Methylparaben
- 2) p-Hydroxybenzoic acid
- 3) Ethylparaben
- 4) Dehydroacetic acid
- 5) n-Propylparaben
- 6) Sorbic acid
- 7) Benzoic acid
- 8) Isobutylparaben
- 9) n-Butylparaben
- 10) Salicylic acid

Column phase: GROM-SIL 120 ODS-3 CP, 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent: 0.05 M  $\text{NaH}_2\text{PO}_4$ , pH 4.5 + 4 mM cetyltrimethylammonium chloride / MeOH / ACN = 50 / 35 / 15  
 Flow rate: 0.8 ml/min  
 Pressure: 14 MPa  
 Temperature: 21°C  
 Detection (UV): 235 nm  
 Injection: 10  $\mu$ l (5  $\mu$ g/ml)

**02 113 Determination of Benzodiazepins by HPLC**

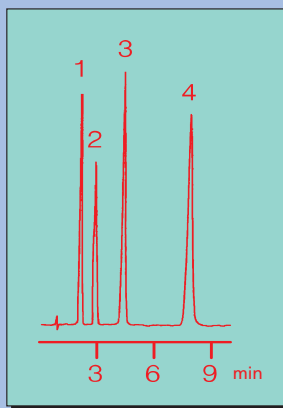
- 1) Demoxepam
- 2) Nitrazepam
- 3) N-Desmethyl-chlordiazepoxide
- 4) Oxazepam
- 5) Chlordiazepoxide
- 6) N-Desmethyl-diazepam
- 7) Temazepam
- 8) Diazepam

Column phase: GROM-SIL 100 Octyl-2 AB, 5  $\mu$ m  
 Column size: 150 x 4 mm  
 Eluent: 0.1 M  $\text{NH}_4$ -acetate, pH 6.0 / MeOH / ACN = 57 / 26.5 / 16.5  
 Flow rate: 1.5 ml/min  
 Pressure: 12 MPa  
 Temperature: 30°C  
 Detection (UV): 245 nm, 0.02 AUFS  
 Injection: 10  $\mu$ l (~20 ng, each)

**06 111 Determination of tricyclic Antidepressants by HPLC**

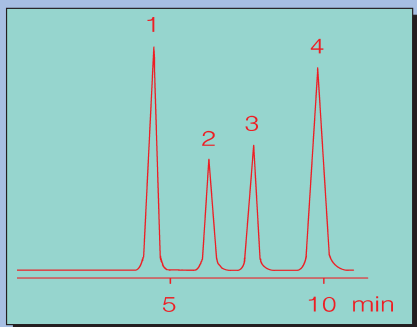
- 1) Trimipramine
- 2) Doxepine
- 3) Amitriptyline
- 4) Imipramine
- 5) Nortiptyline
- 6) Desipramine
- 7) Protriptyline

Column phase: GROM-SIL 120 Cyan-3 CP, 5  $\mu$ m  
 Column size: 150 x 4 mm  
 Eluent: 0.012 M  $\text{KH}_2\text{PO}_4$ , pH 6.7 / MeOH / ACN = 17 / 43 / 40  
 Flow rate: 1.7 ml/min  
 Pressure: 15 MPa  
 Temperature: RT  
 Detection (UV): 215 nm  
 Injection: 20  $\mu$ l

**01 114 Analysis of Antibiotics**

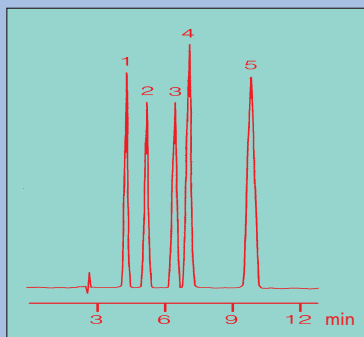
- 1) Ampicillin
- 2) Oxacillin
- 3) Coxacillin
- 4) Dicloxacillin

Column phase: GROM-SIL 120 ODS-4 HE, 5  $\mu$ m  
 Column size: 125 x 4 mm  
 Eluent: 1% triethylammonium acetate, pH 4.0 / ACN = 70 / 30  
 Flow rate: 1.5 ml/min  
 Pressure: 18 MPa  
 Temperature: 21°C  
 Detection (UV): 220 nm, 0.05 AUFS  
 Injection: 20  $\mu$ l (3-5  $\mu$ g, each)

**01 112 Analysis of Sulfonamides**

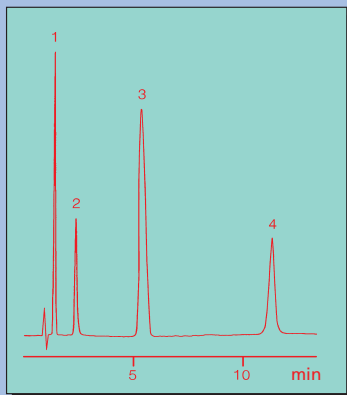
- 1) Sulfaguanidine
- 2) Sulfathiazole
- 3) Sulfapyridine
- 4) Sulfamethazine

Column phase: GROM-SIL 100 ODS-2 FE, 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent: water / methanol = 60 / 40  
 Flow rate: 0.8 ml/min  
 Pressure: 16 MPa  
 Temperature: RT  
 Detection (UV): 230 nm, 0.02 AUFS  
 Injection: 10  $\mu$ l (20  $\mu$ g/ml)

**03 115 HPLC of Bile Acids**

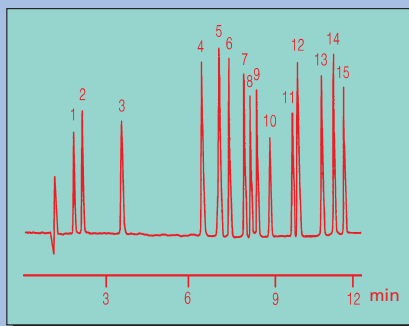
- 1) Ursodeoxycholic acid
- 2) Cholic acid
- 3) Chenodeoxycholic acid
- 4) Deoxycholic acid
- 5) Lithocholic acid

Column phase: GROM-SIL 120 Phenyl-2 CP, 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent: 0.05 M  $\text{NaH}_2\text{PO}_4$ , pH 7.0 / MeOH / EtOH = 40 / 50 / 10  
 Flow rate: 0.8 ml/min  
 Pressure: 12 MPa  
 Temperature: 40°C  
 Detection (UV): 200 nm  
 Injection: 10  $\mu$ l (20 - 100  $\mu$ g/ml)

**01 116 HPLC Analysis of Antiarythmics**

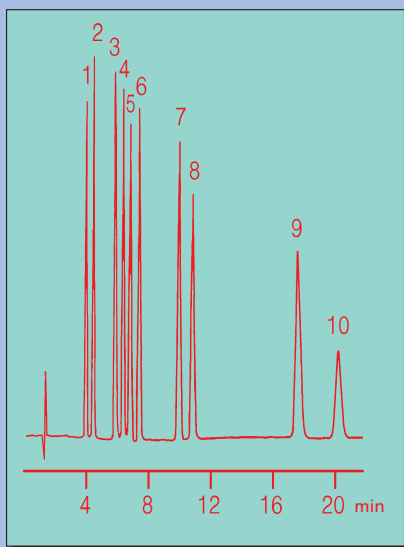
- 1) Procaine
- 2) Lidocaine
- 3) Quinidine sulfate
- 4) Benzocaine

Column phase: GROM-SIL 120 ODS-3 CP, 5  $\mu$ m  
 Column size: 125 x 4 mm  
 Eluent: 0.05% triethylammonium acetate, pH 4.0 / ACN = 80 / 20  
 Flow rate: 1.2 ml/min  
 Pressure: 14 MPa  
 Temperature: 21°C  
 Detection (UV): 220 nm, 0.05 AUFS  
 Injection: 5  $\mu$ l (4 - 10  $\mu$ g, each)

**02 118 Analysis of Pesticides**

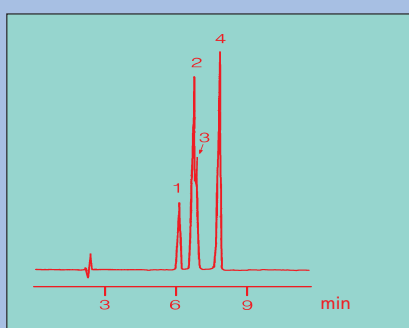
- 1) Methomyl
- 2) Oxamyl
- 3) Fenurone
- 4) Monurone
- 5) Carburone
- 6) Propoxur
- 7) Carbaryl
- 8) Fluometuron
- 9) Diurone
- 10) Propham
- 11) Sidurone
- 12) Linurone
- 13) Chlorpropham
- 14) Barban
- 15) Neburone

Column phase: GROM-SIL 100 Octyl-4 FE, 3  $\mu$ m  
 Column size: 150 x 4mm  
 Eluent A: water  
 B: ACN  
 Gradient: 18% B - 65% B (0-9 min), 65% B (9-12 min)  
 Flow rate: 1.5 ml/min  
 Pressure: 19 MPa  
 Temperature: 35°C  
 Detection (UV): 240 nm, 0.05 AUFS  
 Injection: 10  $\mu$ l (20 - 200 ng, each)

**02 117 Analysis of Triazine Pesticides**

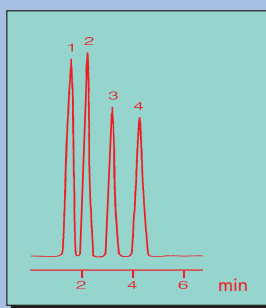
- 1) Simazine
- 2) Atraton
- 3) Simetryn
- 4) Atrazine
- 5) Secbumetone
- 6) Prometone
- 7) Ametryn
- 8) Promazine
- 9) Prometryn
- 10) Terbutryn

Column phase: GROM-SIL 120 Octyl-3 BA, 3  $\mu$ m + guard column  
 Column size: 150 x 4 mm  
 Eluent: 0.1 M  $\text{NH}_4$ -acetate, pH 6.0 / ACN = 67 / 33  
 Flow rate: 1.2 ml/min  
 Pressure: 21 MPa  
 Temperature: 0°C  
 Detection (UV): 220 nm, 0.05 AUFS  
 Injection: 10  $\mu$ l (20 - 30 ng, each)

**05 119 Determination of Bradykinins by Reversed Phase Chromatography**

- 1) Lys-Bradykinin
- 2) Bradykinin
- 3) Met-Lys-Bradykinin
- 4) Des-Arg-Bradykinin

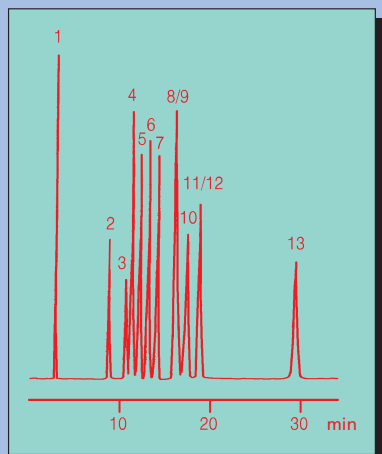
Column phase: GROM-SIL 300 TMS-2 CP, 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent A: 0.1% TFA in  $\text{H}_2\text{O}$   
 B: 0.1% TFA in ACN  
 Gradient: 15-60% B (0-15 min)  
 Flow rate: 1.2 ml/min  
 Pressure: 15 MPa  
 Temperature: 40°C  
 Detection (UV): 214 nm  
 Injection: 15  $\mu$ l

**01 120 Analysis of Antihistamines**

- 1) Phenylpropanolamine
- 2) Diphenylhydramine
- 3) Pseudoephedrine
- 4) Promethazine

Column phase: GROM-SIL 120 ODS-4 HE, 5  $\mu$ m  
 Column size: 125 x 4 mm  
 Eluent: 0.1% triethylammonium acetate, pH 4.0 / ACN = 40 / 60  
 Flow rate: 1.2 ml/min  
 Pressure: 16 MPa  
 Temperature: 21°C  
 Detection (UV): 220 nm, 0.02 AUFS  
 Injection: 10  $\mu$ l (1 - 10  $\mu$ g, each)

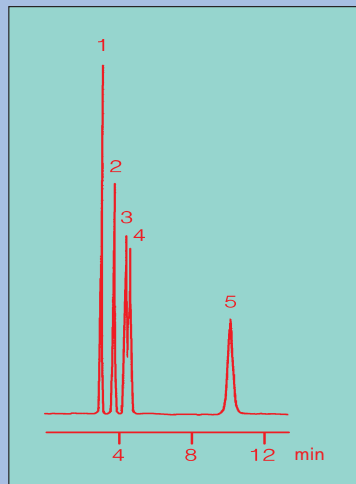
## 01 121 HPLC of Surface Active Detergents



- 1) Lauryldimethylaminoacetic acid betaine
- 2) 2-Lauryl-N-carboxymethyl-N-hydroxyethylimidazolium betaine
- 3) Lauryldimethylaminoxide
- 4) Na-N-Lauroylmethylaurate
- 5) Na-N-Lauroyl-L-glutamate
- 6) Laurinic acid diethanolamide
- 7) Lauric acid monoethanolamide
- 8) Na-Laurylsulfonate
- 9) Na-Laurylsulfate
- 10) Na-N-Lauroylsarcosinate
- 11) Na-β-Laurylamino-propionate
- 12) Na-N-Lauroylsulfosuccinate
- 13) Na-Laurate

Column phase: GROM-SIL 120 ODS-3 CP, 5 μm  
 Column size: 250 x 4 mm  
 Eluent: 0.25 M NaClO<sub>4</sub>, pH 2.5 (with H<sub>3</sub>PO<sub>4</sub>) / MeOH = 30 / 70  
 Flow rate: 0.8 ml/min  
 Pressure: 16 MPa  
 Temperature: 50°C  
 Detection: RI  
 Injection: 20 μl

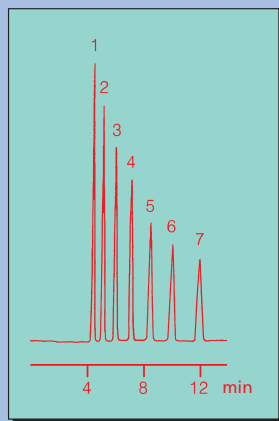
## 06 124 HPLC of Steroids



- 1) Progesterone
- 2) Estrone
- 3) β-Estradiol
- 4) Ethynylestradiol
- 5) Prednisolone

Column phase: GROM-SIL 120 Cyan-3 CP, 5 μm  
 Column size: 250 x 4 mm  
 Eluent: EtOH / n-hexane = 5 / 95  
 Flow rate: 1.5 ml/min  
 Pressure: 15 MPa  
 Temperature: 21°C  
 Detection (UV): 220 nm  
 Injection: 20 μl

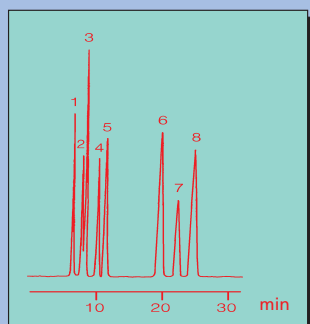
## 07 122 Analysis of Oligosaccharides



- 1) Glucose
- 2) Maltose
- 3) Maltotriose
- 4) Maltotetraose
- 5) Maltopentaose
- 6) Maltohexaose
- 7) Maltoheptaose

Column phase: GROM-SIL 120 Amino-3 CP, 5 μm  
 Column size: 250 x 4 mm  
 Eluent: water / ACN = 35 / 65  
 Flow rate: 0.8 ml/min  
 Pressure: 11 MPa  
 Temperature: 40°C  
 Detection: RI  
 Injection: 20 μl

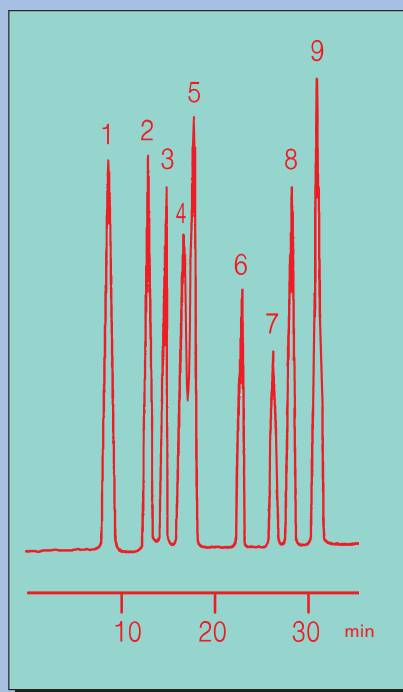
## 07 123 Separation of Mono- and Disaccharides



- 1) Rhamnose
- 2) Xylose
- 3) Fructose
- 4) Mannose
- 5) Glucose
- 6) Sucrose
- 7) Lactose
- 8) Maltose

Column phase: GROM-SIL 120 Amino-3 CP, 5 μm  
 Column size: 250 x 4 mm  
 Eluent: water / ACN = 15 / 85  
 Flow rate: 0.8 ml/min  
 Pressure: 10 MPa  
 Temperature: 40°C  
 Detection: RI  
 Injection: 20 μl

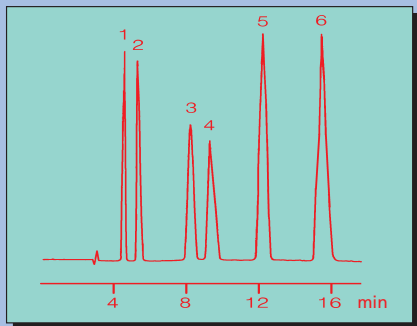
## 01 125 Analysis of Polyphenols by HPLC



- 1) Gallic acid
- 2) Protocatechic acid
- 3) Catechin
- 4) Chlorogenic acid
- 5) Epicatechin
- 6) Rutin
- 7) Fisetin
- 8) Quercetin
- 9) Campferol

Column phase: GROM-SIL 120 ODS-5 ST, 5 μm  
 Column size: 250 x 4 mm  
 Eluent A: 0.5% H<sub>3</sub>PO<sub>4</sub> / MeOH = 10 / 90  
 B: ACN  
 Gradient: 0-100% B (0-30 min)  
 Flow rate: 0.8 ml/min  
 Pressure: 16 MPa  
 Temperature: 21°C  
 Detection (UV): 254 nm  
 Injection: 10 μl

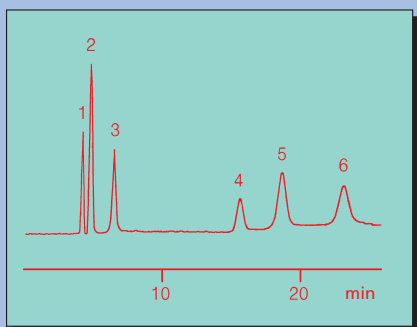
## 06 126 HPLC Analysis of Opium Alkaloids



- 1) Morphine
- 2) Codeine
- 3) Cryptopine
- 4) Thebaine
- 5) Narcotine
- 6) Papaverine

Column phase: GROM-SIL 100 Cyan-2 PR, 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent: 1%  $\text{NH}_4$ -acetate, pH 5.8 / ACN / dioxane = 80 / 10 / 10  
 Flow rate: 1.2 ml/min  
 Pressure: 15 MPa  
 Temperature: 21°C  
 Detection (UV): 254 nm  
 Injection: 10  $\mu$ l

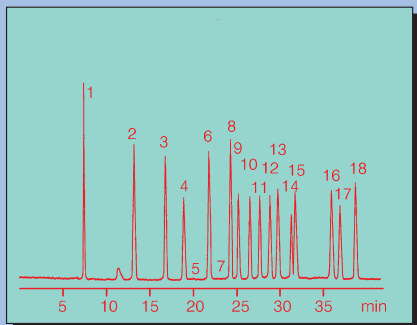
## 07 127 Separation of Nucleotides



- 1) GMP
- 2) AMP
- 3) IMP
- 4) GDP
- 5) ADP
- 6) IDP

Column phase: GROM-SIL 120 Amino-3 CP, 5  $\mu$ m  
 Column size: 250 x 4.6 mm  
 Eluent A: 5 mM  $\text{KH}_2\text{PO}_4$ , pH 2.9, 15% ACN  
 B: 500 mM  $\text{KH}_2\text{PO}_4$ , pH 4.0, 15% ACN  
 Gradient: 40 - 100% B (0-20 min), 100% B (20-25 min)  
 Flow rate: 2 ml/min  
 Pressure: 14 MPa  
 Temperature: RT  
 Detection (UV): 254 nm  
 Injection: 10  $\mu$ l (160  $\mu$ g/ml)

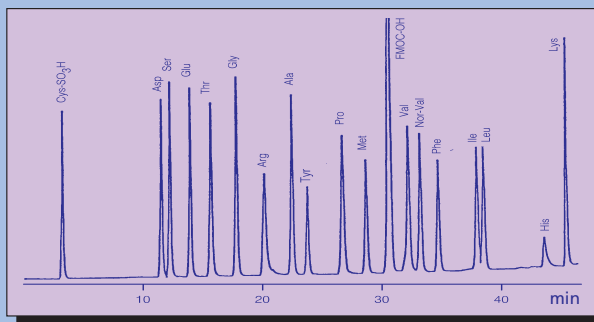
## 01 128 HPLC Analysis of Explosives



- 1) HMX
- 2) RDX
- 3) TNB
- 4) 2-Am-4-NT
- 5) 1,2-DNB
- 6) DNB
- 7) 3,5-DNA
- 8) Tetryl
- 9) NB
- 10) TNT
- 11) 3,4-DNT
- 12) 4-Am-2,6-DNT
- 13) 2-Am-4,6-DNT
- 14) 2,6-DNT
- 15) 2,4-DNT
- 16) 2-NT
- 17) 4-NT
- 18) 3-NT

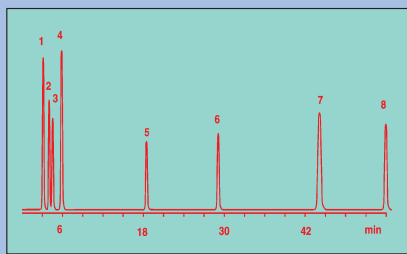
Column phase: GROM-SIL 80 ODS-7 pH, 4  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent A:  $\text{H}_2\text{O}$  + 0.3% THF (v/v)  
 B: methanol + 0.3% THF (v/v)  
 Gradient: 40% - 80% B (0-40 min)  
 Flow rate: 1 ml/min  
 Pressure: 19 MPa  
 Temperature: RT  
 Detection (UV): 240 nm  
 Injection: 10  $\mu$ l (10 - 100  $\mu$ g/ml)

## 10 130 Amino Acid Analysis employing Precolumn Derivatisation with FMOc followed by Pentane Extraction



Column phase: GROM-SIL FMOc 1  
 Column size: 250 x 4.6 mm  
 Eluent A: 50 mM Na-acetate, pH 4.2 / ACN = 80 / 20  
 B: 50 mM Na-acetate, pH 4.2 / ACN = 20 / 80  
 Gradient: 0-40% B (0-35 min), 40-70% B (35-45 min), 70-100% B (45-50 min)  
 Flow rate: 1 ml/min  
 Pressure: 17 MPa  
 Temperature: 40°C  
 Detection (Fluor.): 263 nm exc., 313 nm em.  
 Injection: 10  $\mu$ l (10  $\mu$ M each)

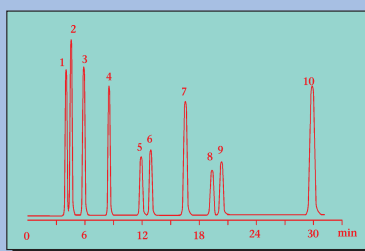
## 01 166 Drug Analysis (Calcium Channel)



- 1) Diltiazem
- 2) Verapamil
- 3) Methoxyverapamil
- 4) Nicardipine
- 5) Phenylamine lactate
- 6) Bepridil
- 7) Niguldipine
- 8) Nifedipine

Column phase: GROM-SIL ODS-7 pH, 4  $\mu$ m  
 Column size: 150 x 4.0 mm  
 Eluent A: 20 mM  $\text{KH}_2\text{PO}_4$  pH 3.0 (85%) /  $\text{H}_2\text{O}$   
 B: ACN  
 C: THF  
 D: TBA-Br  
 isocratic: 74.5% A, 15% B, 10% C, 0.5% D -  
 Flow rate: 0.6 ml/min  
 Pressure: 8.7 MPa  
 Temperature: 30°C  
 Detection (UV): 270 nm  
 Injection: 5  $\mu$ l (0.05 to 1.5 mg/ml of each)

## 01 167 Penicillin Antibiotics



- 1) Bacampicillin
- 2) Methicillin
- 3) Benzylpenicillin
- 4) Phenoxymethylpenicillin
- 5) Phen-oxethylpenicillin
- 6) Phenoxypropylpenicillin
- 7) Cloxacillin
- 8) Propicillin
- 9) Proicillin
- 10) Dicloxacillin

Column phase: GROM-SIL ODS-7 pH, 4  $\mu$ m  
 Column size: 150 x 4.0 mm  
 Eluent: 50 mM  $\text{NaH}_2\text{PO}_4$  pH 2.3  
 Flow rate: 0.75 ml/min  
 Pressure: 17 MPa  
 Temperature: 37°C  
 Detection (UV): 220 nm  
 Injection: 8  $\mu$ l (~ 0.13 mg/ml of each)

..... **outstanding, novel**

**Miniaturization of HPLC**, such as  
Capillary HPLC (on-line LC/MS) Microbore HPLC requires  
thin columns in order to achieve maximum of sensitivity

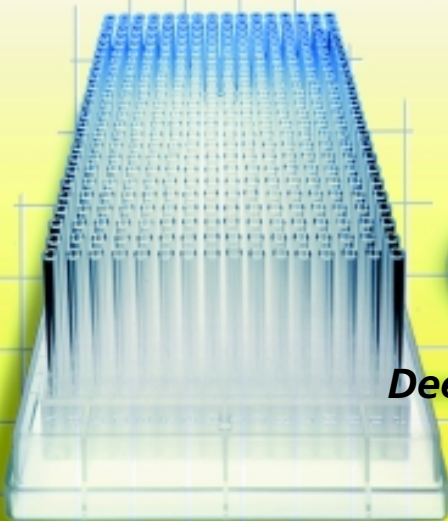
..... therefore urgently needed:

Chemically resistant glass microtiterplates for sample storage,  
robotic sample application, fraction collection, combinatorial  
chemistry and many other applications prior to or following  
HPLC.

Deep Well Microtiter **GROM-** Plates  
made from glass

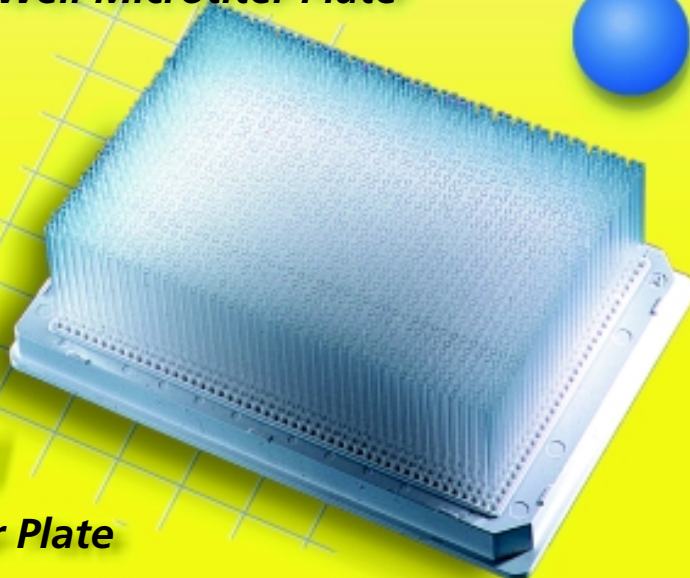
**96-well**

*Deep Well Microtiter Plate*



**384-well**

*Deep Well Microtiter Plate*



**1536-well**

*Deep Well Microtiter Plate*

For more detailed informations see pages 91 and 92

# HPLC technologies:

## Combinatorial Chemistry

requires

short columns to dramatically increase sample throughput (HTS)

for highly efficient and rapid chromatography:

## **NovoGROM** low-dispersion, High Speed HPLC columns



50 x 0,3 mm i.d. capillary High Speed column



50 x 1.0 mm i.d. microbore High Speed column



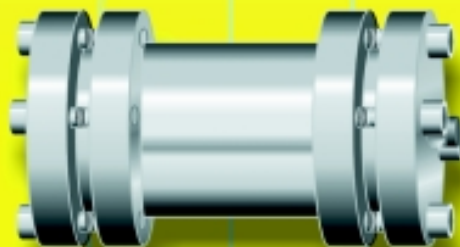
50 x 4.0 mm i.d. analytical High Speed column



50 x 8,0 mm i.d. semipreparative High Speed column



50 x 20 mm i.d. preparative High Speed column



50 x 50 mm i.d. preparative High Speed column

For more detailed informations see pages 87-90

# New .... in the Service of Science:

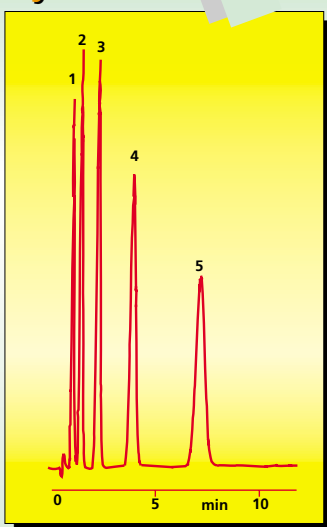
# NovoGROM

## Ultra-stable Zirconia-based stationary phases outclassing polymeric and other HPLC columns

**GROM Zirconia** phase-packed HPLC columns represent superior alternative to polymeric columns. They possess all of the advantages of polymeric columns with none of the drawbacks and show extreme chemical and thermal stability.

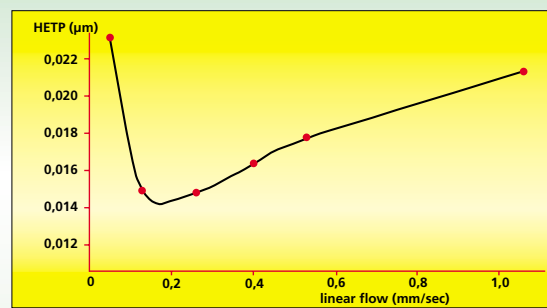
**GROM Zirconia** phase-packed columns show superior efficiency, allow highly reproducible separations particularly for gradient elution, and exhibit selectivity similar to bonded phases for easier method development.

### Analysis of Benzoates by Novel Zirconia Phases



- 1) Methyl benzoate
- 2) Ethyl benzoate
- 3) Propyl benzoate
- 4) Butyl benzoate
- 5) Pentyl benzoate

### Influence of linear flow on HETP

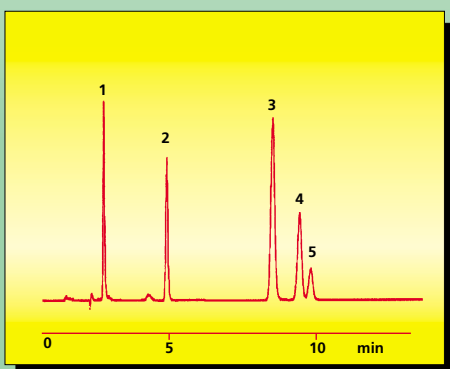


**Column phase:** GROM-Zirconia RPP, 3 µm  
**Column size:** 50 x 2 mm  
**Eluent:** H<sub>2</sub>O / ACN = 65 / 35  
**Flow rate:** 1.0 ml/min  
**Pressure:** 16 MPa  
**Temperature:** RT  
**Detection (UV):** 254 nm (1.2 µl flow cell)  
**Injection:** 2 µl (50-150 µg/ml of each)

## .... outstanding features

- Extraordinary pH (1-14) and unique temperature stability ( $\geq 200^\circ\text{C}$ )
- Superior efficiency
- Exceptional solvent resistance and selectivity very similar to bonded phases

- ➔ At least equivalent to all polymer brands
- ➔ Nearly twice as efficient as most polymer brands
- ➔ Enables easy method developments



### Analysis of

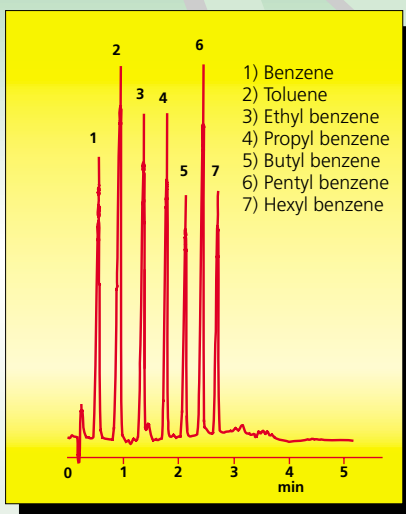
- 1) Resorcinol, 2) Benzonitrile,
- 3) Methyl benzoate, 4) Anisole, 5) Benzene

**Column phase:** Zirconia RP P, 3 µm  
**Column size:** 150 x 4.6 mm  
**Eluent:** ACN / H<sub>2</sub>O = 15 / 85  
**Flow rate:** 1.0 ml/min  
**Pressure:** 18 MPa  
**Temperature:** 50°C  
**Detection (UV):** 254 nm  
**Injection:** 5 µl

# HPLC columns packed with

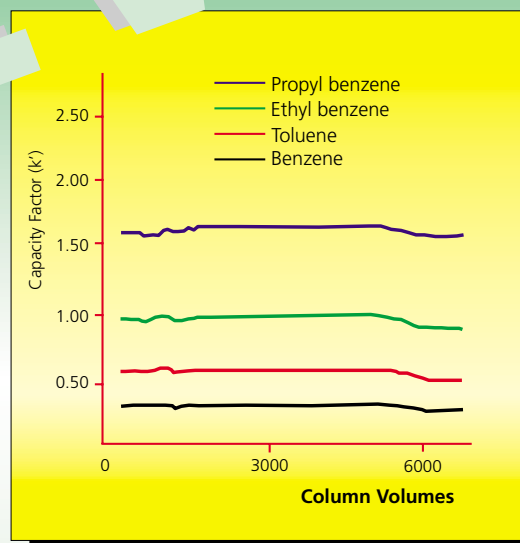
## Zirconia phases guaranteeing unmatched chemical and thermal stability

### Gradient Separation of n-Alkyl-benzenes by Novel Zirconia Phases

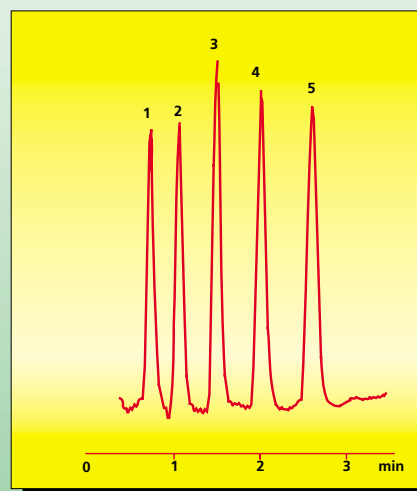


**Column phase:** GROM-SIL Zirconia RP P, 3 µm  
**Column size:** 50 x 2 mm  
**Eluent A:** H<sub>2</sub>O  
**B:** ACN  
**Gradient:** 30 - 80% B (0 - 2.5 min)  
**Flow rate:** 0.6 ml/min  
**Pressure:** 10 MPa  
**Temperature:** RT  
**Detection (UV):** 254 nm (1.2 µl flow cell)  
**Injection:** 2 µl (3 mg/ml of each)

### Thermal Stability at 195°C



### Gradient Separation of Benzoates by Novel Zirconia Phases



1) Methyl benzoate  
 2) Ethyl benzoate  
 3) Propyl benzoate  
 4) Butyl benzoate  
 5) Pentyl benzoate

**Column phase:** GROM-SIL Zirconia RP C, 3 µm  
**Column size:** 50 x 2 mm  
**Eluent A:** H<sub>2</sub>O  
**B:** ACN  
**Gradient:** 30 - 80% B (0 - 4.0 min)  
**Flow rate:** 1.0 ml/min  
**Pressure:** 32 MPa  
**Temperature:** RT  
**Detection (UV):** 254 nm (1.2 µl flow cell)  
**Injection:** 2 µl (50-150 µg/ml of each)

GZ RP P ....C0503	Zircon RP P, capillary column,	50 x 0.3 mm
GZ RP P ....C1003	Zircon RP P, capillary column,	100 x 0.3 mm
GZ RP P ....C1503	Zircon RP P, capillary column,	150 x 0.3 mm
GZ RP P ....S0501	Zircon RP P, microbore column,	50 x 1 mm
GZ RP P ....S1001	Zircon RP P, microbore column,	100 x 1 mm
GZ RP P ....S1501	Zircon RP P, microbore column,	150 x 1 mm
GZ RP P ....S0502	Zircon RP P, narrowbore column,	50 x 2 mm
GZ RP P ....S1002	Zircon RP P, narrowbore column,	100 x 2 mm
GZ RP P ....S1502	Zircon RP P, narrowbore column,	150 x 2 mm
GZ RP P ....S0504	Zircon RP P, analytical column,	50 x 4.0 mm
GZ RP P ....S1004	Zircon RP P, analytical column,	100 x 4.0 mm
GZ RP P ....S1504	Zircon RP P, analytical column,	150 x 4.0 mm
GZ RP P ....S0505	Zircon RP P, analytical column,	50 x 4.6 mm
GZ RP P ....S1005	Zircon RP P, analytical column,	100 x 4.6 mm
GZ RP P ....S1505	Zircon RP P, analytical column,	150 x 4.6 mm

# Tailor-made, customized columns for particular applications

In order to ensure the validity of HPLC results over an extended period of time, not only is the reproducibility of filling the column important but also to a high degree the batch-to-batch reproducibility of the packing material itself, whereby excellent resolution, respectively high efficiency and long stand times must be taken for granted. This is particularly true for the analysis of complex mixtures such as pesticides, polyaromatic hydrocarbons, amino acids, etc. For a range of selected applications, the time and effort of optimisation of the separation (selection of stationary phase, eluent composition, flow rate, temperature, etc.) may be eliminated simply by choosing the appropriate **GROM** special column. These columns are packed with stationary phases

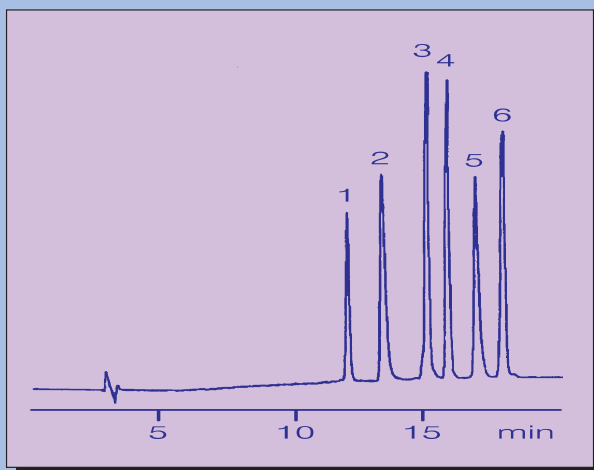
especially developed in our R&D laboratories for a particular application. The stationary phases are subjected to stringent quality control in order to guarantee the absolute reproducibility of their selectivity for the separation in question. Each special column is accompanied by a detailed protocol of the chromatographic conditions and, where applicable, the conditions of derivatization.

**GROM** special columns are available in both the standard **NovoGROM** hardware or as **NovoGROM** cartridges for use with quick connectors in the sizes 2, 3 and 4 mm internal diameter. (Please enquire for other dimensions, e.g., **NovoGROM** Microbore or **NovoGROM** capillary columns.)

## I. Biochemical applications

### Proteins and peptides

#### 10 129 Peptide Separation



- 1) Oxytocin
- 2) Bradykinin
- 3) Angiotensin
- 4) Eledoisin
- 5) Neurotensin
- 6) Angiotensin I

Column phase: GROM-Bio RP-1 (C18), 5  $\mu$ m  
 Column size: 250 x 2 mm  
 Eluent A: 0.1% TFA in H<sub>2</sub>O  
 B: 0.1% TFA in H<sub>2</sub>O / ACN = 30 / 70  
 Gradient: 5 - 100% B (0-30 min)  
 Flow rate: 0.3 ml/min  
 Pressure: 16 MPa  
 Temperature: RT  
 Detection (UV): 210 nm  
 Injection: 10  $\mu$ l (= 10 pMol)

Stationary phase	Field of application	Order number
GROM-Bio Reversed Phase I widepore C18	small polypeptides, nucleotides	GS BR 1 0530 K 2502 250 x 2 mm cartridge
GROM-Bio Reversed Phase II widepore C8	peptides, medium sized proteins	GS BR 2 0530 K 2502 250 x 2 mm cartridge
GROM Bio Reversed Phase III widepore C4	proteins (MW 3 000 Dalton)	GS BR 3 0530 K 2502 250 x 2 mm cartridge

### Amino acids

For detailed information see pages 53-67.

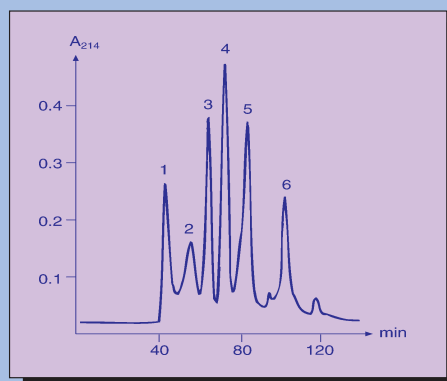
## High performance prepacked size exclusion chromatography column

# Novarose™ SE - 100/17 for Size Exclusion Chromatography

Superior performance in purification, molecular weight determination and fast desalting of peptides and proteins

A new emulsification and crosslinking method has made it possible to modify highly purified agarose and to produce small, spherical beads, thereby decreasing pore size and particle size while keeping the matrix volume low. Thus, outstanding results are obtained employing **Novarose SE** in high performance size exclusion chromatography. **Novarose™ SE - 100 / 17** columns are designed for analytical and semi-preparative separations of

## 10 184 Analytical separation of protein mixture



biopolymers such as proteins in the 10,000 to 100,000 Daltons molecular weight range. Due to the low diffusion coefficients involved, protein separation requires comparatively **low flow rates** to give **high resolution** in size exclusion chromatography. This is especially true when highly heterogeneous samples are applied. Nevertheless, impurities, which are always of interest but hidden at higher flow rates, can easily be detected at relative low flow rates.



**Experimentals conditions:** column: Novarose™ SE - 100 / 17-300 x 8 mm; eluent: 0.05 M Na-phosphate pH 6.7, 0.15 M NaCl; **flow rate:** 0.25 ml / min; **temperature:** ambient; **detection (UV):** 214 nm; **sample injected:** mixture of 1) 24.6 µg, thyroglobulin, 2) 24.6 µg aldolase, 3) 12.3 µg ovalbumin, 4) 12.4 µg carbonic anhydrase, 5) 24.0 µg ribonuclease and 25.0 µg insulin dissolved in 80 µl eluent buffer.

The following table summarizes the separation efficiency for carbonic anhydrase (peak 4) at different flow rates. Decreasing the flow rate clearly demonstrates the slower diffusion rate of larger molecules. The efficiency nearly doubles when reducing the flow rate by half.

### Data of resolution of proteins

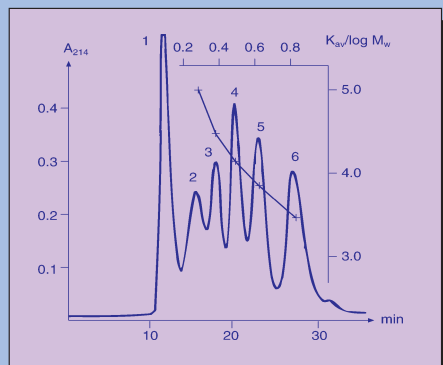
flow rate [ml / min]	resolution between two successive peaks				efficiency* N/m
	2/3	3/4	4/5	5/6	
1.00	0.44	0.56	0.71	1.08	1420
0.50	0.54	0.79	0.91	1.16	2900
0.25	0.77	0.96	1.11	0.89	4267
0.10	0.96	1.30	1.46	1.88	8113
0.05	1.11	1.34	1.57	2.00	8317

\* calculated on carbonic anhydrase, peak 4 (same experimental conditions as in Applic. 10 184)

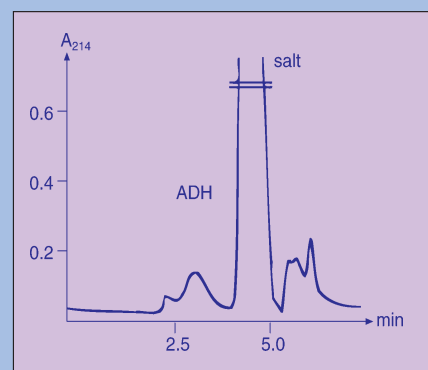
This figure represents an easy, quick method for the determination of molecular weights of globular proteins. The  $K_{av}$  values for the different proteins in the mixture are calculated and plotted against the logarithm of their molecular weight. Good linearity is shown in the recommended separation range.

**Experimental conditions:** s. above, except 0.5 ml/min flow rate

## 10 185 Protein molecular weight determination



## 10 186 Desalting of alcohol dehydrogenase



However, often speed is also considered as an important parameter in chromatographic procedures especially for less complex separations, such as the removal of salt from a biopolymer preparation or buffer exchange. A quick and simple desalting step is often required prior to enzymatic digestion. The rigidity and chemical stability of the **Novarose SE** also make it ideal for high flow rates or use with extreme pH values. Thus, the figure „desalting of alcohol-dehydrogenase“ shows the facile removal of 6 M guanidinium hydrochloride and dithiothreitol from alcohol dehydrogenase within a few minutes (flow rate 4,0 ml/min).

## II. **GROM** Gel Permeation Chromatography (GPC)

### ... to meet all the needs of highly sophisticated Polymer Analysis

**NovoGROM-GPC columns** are packed with novel styrol divinylbenzene copolymer packings. The spherical, macroporous particles show excellent, narrow particle and pore size distributions, therefore guaranteeing:

- **Extraordinary performance, i.e., superior resolution**
- **Excellent reproducibility**
- **Unique mechanical and chemical strength/stability**
- **High solvent compatibility**
- **Long column durability/life time**

These features are, as always additionally enhanced by **GROM's** quick delivery and prompt, cost-saving refill service. Specially designed, easy-to-handle column hardware enables the optimal flow diversion needed for high resolution. These individually tested columns are normally packed and shipped in tetrahydrofuran (THF). However, upon request, they can be packed in other solvents as well. **Note!** Water or alcohols must never be used as eluents.

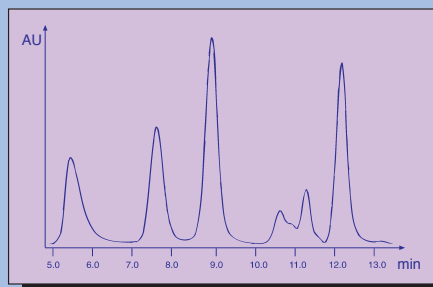
#### Description

Product	Particle Size [µm]	Mol. Weight [Dalton]
NovoGROM- GPC - 100 Å	5 / 10	< 3 x 10 <sup>3</sup>
NovoGROM- GPC - 500 Å	5 / 10	< 2 x 10 <sup>4</sup>
NovoGROM- GPC - 1,000 Å	5 / 10	1 x 10 <sup>3</sup> -4 x 10 <sup>4</sup>
NovoGROM- GPC - 10,000 Å	5 / 10	4 x 10 <sup>3</sup> -5 x 10 <sup>5</sup>
NovoGROM- GPC - 100,000 Å	5 / 10	1 x 10 <sup>4</sup> -2 x 10 <sup>6</sup>
NovoGROM- GPC - 1,000,000 Å	5 / 10	2 x 10 <sup>5</sup> -1 x 10 <sup>7</sup>

#### Specifications

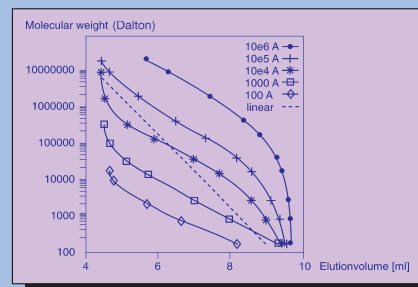
Parameters	Particle Size [5 µm]	Particle Size [10 µm]
Efficiency [N/m], min.	55 000	35 000
typically	> 65 000	> 40 000
Maximum Pressure.	160	160
typical pressure drop / 30 cm	25	15
Maximum Lin. Flow. [cm/min]	3	6
Temperature [°C]	< 100°	< 140°

#### 10 187 Polystyrol separation



Column phase: Linear, 5 µm  
 Column size: 300 x 8 mm  
 Sample: mixture of polystyrols  
 Eluent: THF  
 Flow rate: 1 ml / min  
 Detection: RI  
 Temperature: 25°C

#### Calibration curves of polystyrols (column: 300 x 8 mm)



#### Field of application

Solvents commonly used	Applications
Tetrahydrofuran	styrols, (meth-)acrylates, dienes, PVC, PIB, PC, phenol resins, cellulose esters, tricarbanilates, epoxide resins, polysilanes, PEG
Chloroalkanes	styrols, (meth-)acrylates, dienes, PVC, PIB, PC, polyphenylene oxide etc.
Dioxane	Cl-butadiene, vinyl acetate
Methylethyl ketone	styrols, etc.
Ethyl acetate	styrols, etc.
Cyclohexane	dienes, etc.
Benzene	styrols, dienes, PIB
Toluene	styrols, dienes, PIB, phenylene oxides, silicones
Xylene	styrols, dienes, PIB, phenylene oxides, silicones
o-Dichlorbenzene	styrols, ethylenes, propylenes, EPR, PIB, asphalt, wax
Trichlorbenzene	styrols, ethylenes, propylenes, EPR, PIB, asphalt, wax
m-Kresol	styrols, polyamides, polyesters, photoresists
Chinoline	styrols
Dimethylformamide	APS, PAN, PEO, polysulfones, polyvinyl pyrrolidones, polyurethanes, melamine and phenolic resins
Dimethylacetamide	APS, PAN, PEO, polysulfones, polyvinyl pyrrolidones, polyurethanes, melamine and phenolic resins
N-Methylpyrrolidone	polyimide, poly-THF, polyvinyl pyrrolidone, saccharides
Dimethylsulfoxide	gelatin, lignin, starch, polysaccharides
Hexafluoro-iso-propanol	melamine resins, polyamides, polyesters, polyketones

# III. Novel High Performance High Speed

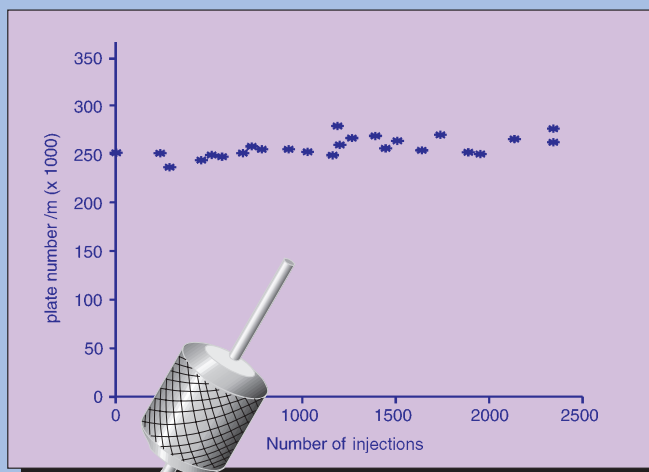
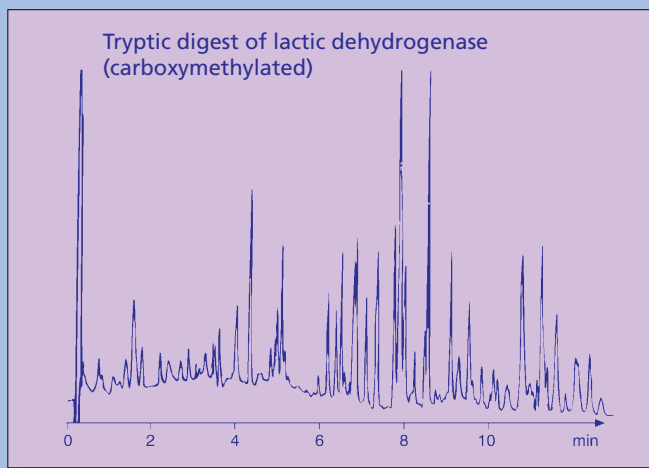
either by uniformly spherical, **porous 1.5  $\mu\text{m}$  ODS particles** or by fully spherical, **non-porous 1.5  $\mu\text{m}$  ODS particles** packed in the unique, out-standing **NovoGROM 33 x 2.0 mm** or resp. **33 x 4.6 mm column hardware**

For high-speed, high-resolution HPLC two types of uniformly spherical **1.5  $\mu\text{m}$  GROM-Sil ODS-2 FE** particles are available, either fully porous microspheres (pore size 100 Å / particle size  $1.5 \pm 0.3 \mu\text{m}$ , specific surface area of 200 m<sup>2</sup>/g) or monodisperse **non-porous** beads (particle size  $1.5 \pm 0.05 \mu\text{m}$ , specific surface area of 2.1 m<sup>2</sup>/g). Both are fully end-capped C18 phases meeting all the requirements of the most advanced high performance liquid chromatography applications. For instance, in a minimum of analysis time, they perform excellent separations of nucleotides, peptides, proteins, pharmaceuticals, etc.

## 10 179 Peptides, tryptic digested

**Column phase:** GROM-SIL 100 ODS-2 FE, 1.5  $\mu\text{m}$   
**Column size:** 33 x 4.6 mm  
**Eluent A:** H<sub>2</sub>O, 0.1% TFA  
**Eluent B:** ACN, 0.1% TFA  
**Gradient:** 0–15 min, 5–60% B  
**Flow rate:** 1ml/min  
**Detection (UV):** 215 nm  
**Temperature:** RT  
**Injection:** 2  $\mu\text{l}$

Even after more than 2 500 injections, both types of columns packed with either 1.5  $\mu\text{m}$  porous- or 1.5  $\mu\text{m}$  non-porous particles still show excellent physical and chemical stability (even in 0.1% TFA containing eluents). There is no change in retention time and practically no increase in pressure drop and peak asymmetry over the life of the column. These **NovoGROM** high speed columns of only 33 mm length provide up to 10 000 plates, and thus in most cases have a resolution nearly identical to that which is typically found for standard analytical HPLC columns.



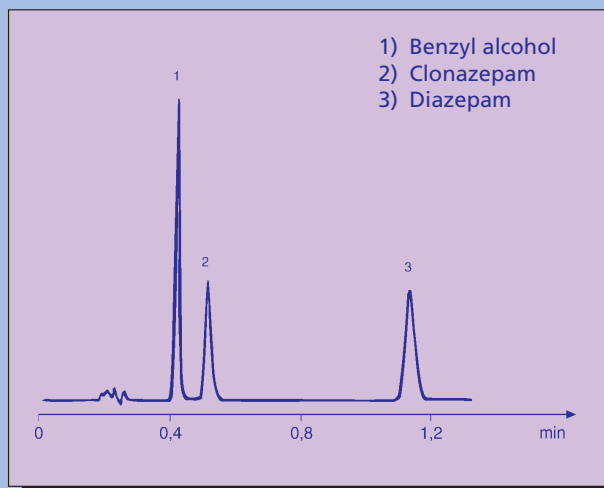
Column lifetime

Employing **NovoGROM** high speed columns you gain tremendously in

- **Speed:** analysis time in seconds or minutes, with up to 90% increase in sample throughput
- **Low solvents consumption:** saves on purchase and disposal costs, decreasing solvent consumption brings improved environmental compatibility
- **Decreased diffusion:** smaller peak volume and less band broadening, i.e., improved sensitivity

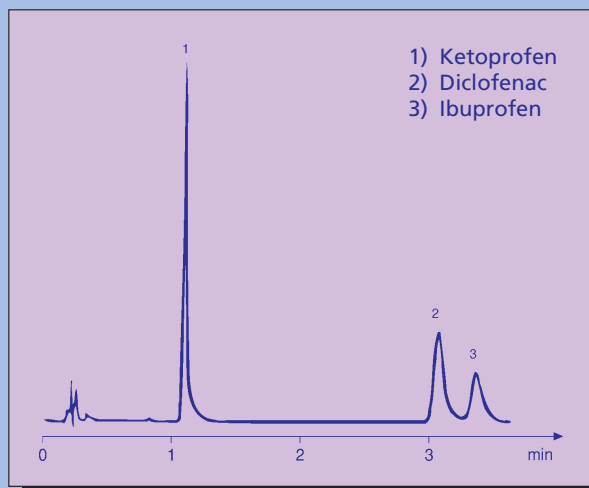
# Liquid Chromatography

## 10 030 b Sedatives -Benzodiazepins



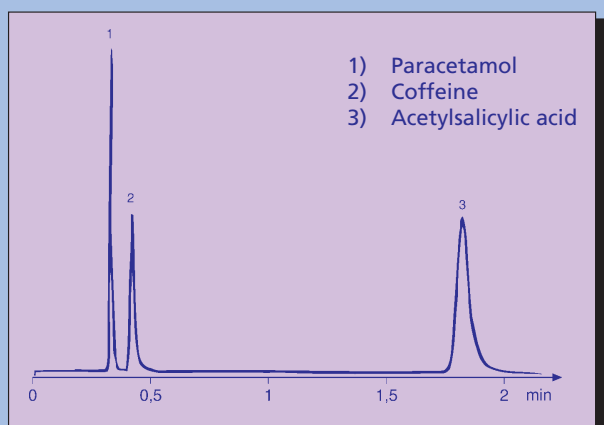
**Column phase:** GROM-SIL 100 ODS-2 FE,  
1.5  $\mu\text{m}$   
**Column size:** 33 x 4.6 mm  
**Eluent:** 35% v/v Acetonitrile,  
65% v/v 0.1% TFA  
**Flow rate:** 1.5 ml/min  
**Pressure:** 26.2 MPa  
**Temperature:** RT  
**Detection:** 254 nm  
**Sample:** 1  $\mu\text{l}$

## 10 031 b Nonsteroid anti-inflammatory drugs



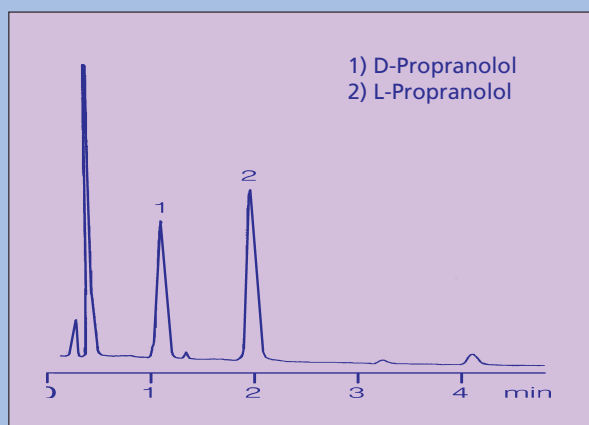
**Column phase:** GROM-SIL 100 ODS-2 FE,  
1.5  $\mu\text{m}$   
**Column size:** 33 x 4.6 mm  
**Eluent:** 40% v/v Acetonitrile,  
60% v/v 0.1% TFA  
**Flow rate:** 1.5 ml/min  
**Pressure:** 26 MPa  
**Temperature:** RT  
**Detection:** 254 nm  
**Sample:** 1  $\mu\text{l}$  (100  $\mu\text{g/ml}$ ,  
Ibuprofen 1000  $\mu\text{g/ml}$ )

## 10 032 c Analgesic, antipyretic Thomapyrin pill



**Column phase:** GROM-SIL 100 ODS-2 FE, 1.5  $\mu\text{m}$   
**Column size:** 33 x 4.6 mm  
**Eluent:** 15% v/v Acetonitrile,  
85% v/v 0.1% TFA  
**Flow rate:** 1.5 ml/min  
**Pressure:** 29.2 MPa  
**Temperature:** RT  
**Detection:** 274 nm; after 1 min, 227 nm  
**Sample:** 10  $\mu\text{l}$  (Paracetamol 2 mg/m<sup>2</sup>,  
Coffeine 0.5 mg/ml, ASA 2 mg/ml)

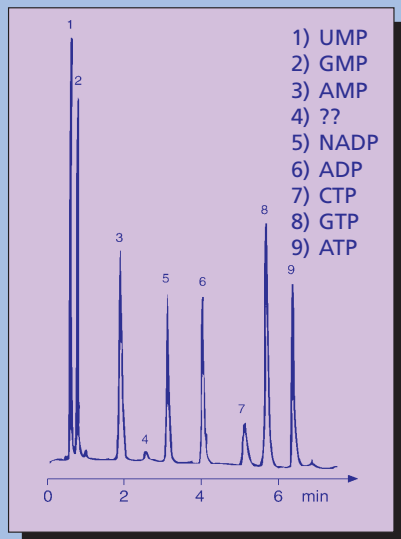
## 10 053 b High Speed HPLC Analysis -Determina- tion of Optical Antipodes of a $\beta$ -Blocker



**Column phase:** GROM-SIL 100 ODS-2 FE, 1.5  $\mu\text{m}$   
**Column size:** 33 x 4.6 mm  
**Eluent:** water / acetonitrile = 30 / 70  
**Flow rate:** 1.0 ml/min  
**Pressure:** 18 MPa  
**Temperature:** RT  
**Detection (Fluor.):** 263 nm (exc.), 313 nm (em.)  
**Injection:** 1  $\mu\text{l}$  (= 500 fmol)

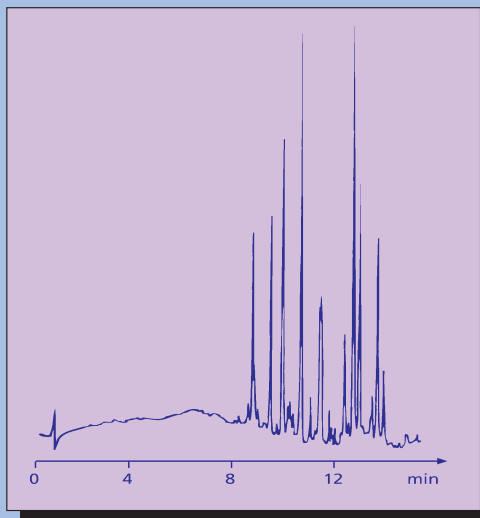
# High Speed Liquid Chromatography

## 10 180 Nucleotides



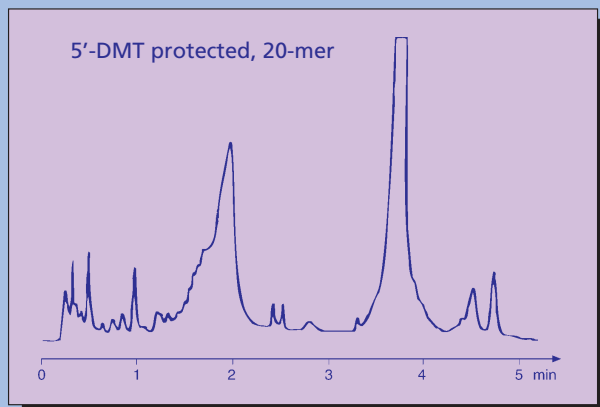
**Column phase:** GROM-SIL 100 ODS-2 FE,  
1.5  $\mu\text{m}$   
**Column size:** 33 x 4.6 mm  
**Eluent:** A: 30 mM  $\text{KH}_2\text{PO}_4$  /  $\text{K}_2\text{HPO}_4$ , 0.5 MTBA, pH 6.0  
B: 60% A + 40% ACN  
**Gradient:** 0–40% B (0–8 min)  
**Flow rate:** 1.5 ml/min  
**Temperature:** RT  
**Detection (UV):** 254 nm  
**Sample:** 10  $\mu\text{l}$  (10  $\mu\text{g}$  each)

## 10 182 Protein Digest



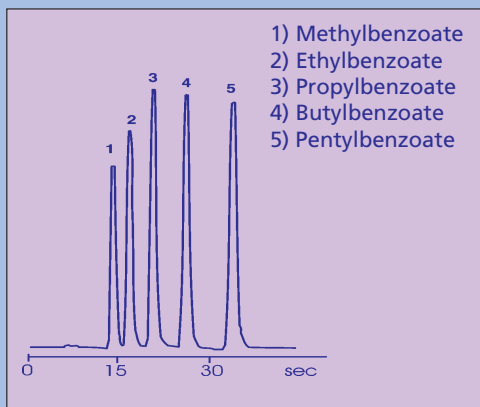
**Column phase:** GROM-SIL 100 ODS-2 FE,  
1.5  $\mu\text{m}$   
**Column size:** 33 x 2.0 mm  
**Eluent:** A: 0.1% TFA in  $\text{H}_2\text{O}$   
B: 0.1% TFA in ACN  
**Gradient:** 5–50% B (0–12 min)  
**Flow rate:** 0.2 ml/min  
**Pressure:** 10–27 MPa  
**Temperature:** RT  
**Detection (UV):** 214 nm  
**Sample:** 1  $\mu\text{l}$  (5 pMol)

## 10 181 Antisense-Oligonucleotides



**Column phase:** GROM-SIL 100 ODS-2 FE,  
1.5  $\mu\text{m}$   
**Column size:** 33 x 4.6 mm  
**Eluent:** A: 0.05 M TEAA, pH 7.0  
B: 30% A + 70% ACN  
**Gradient:** 0–70% B (0–6 min)  
**Flow rate:** 1.0 ml/min  
**Temperature:** RT  
**Detection (UV):** 260 nm  
**Sample:** 10  $\mu\text{l}$  (10  $\mu\text{g}$  each)

## 10 162 High Speed Separation of Benzoates

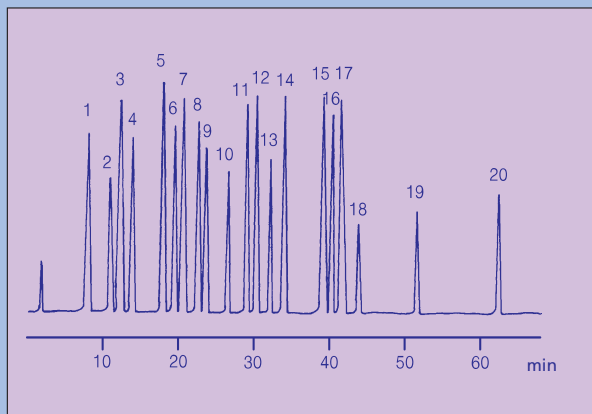


**Column phase:** GROM-SIL-ODS 0 AB, 1.5  $\mu\text{m}$   
**Column size:** 33 x 4 mm  
**Eluent:**  $\text{H}_2\text{O}$  / ACN = 30 / 70  
**Flow rate:** 2 ml/min  
**Pressure:** 23,8 MPa  
**Temperature:** RT  
**Detection (UV):** 254 nm  
**Sample:** 1  $\mu\text{l}$  (0,5-1,5 mg/ml of each)

# IV. Environmental analysis

## Pesticides

### 10 070 Analysis of Pesticides by Reversed Phase HPLC - I



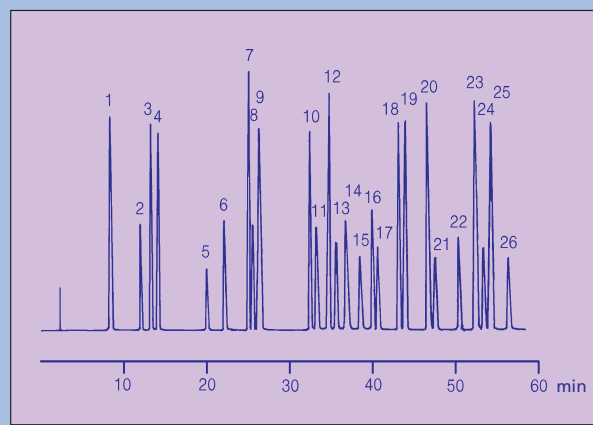
Column phase: GROM-SIL PE-1 (tailor-made)  
 Column size: 250 x 4 mm  
 Eluent A: 1 mM ammonium acetate  
 B: ACN  
 Gradient: 10-60% B (0-60 min)  
 Flow rate: 0.9 ml/min  
 Pressure: 12 MPa  
 Temperature: 40°C  
 Detection (UV): 230 nm  
 Injection: 10 µl (0.5 - 100 µg/ml)

- |                       |                   |                       |
|-----------------------|-------------------|-----------------------|
| 1) Crimidine          | 8) Isoproturone   | 15) Prometone         |
| 2) Bromacil           | 9) Metobromurone  | 16) Clorpropham       |
| 3) Simacine           | 10) Buturone      | 17) Terbutryne        |
| 4) Hexazinone         | 11) Ametryn       | 18) Metholachlor      |
| 5) Metabenzthiazurone | 12) Propazine     | 19) Pentachlorophenol |
| 6) Chlortolurone      | 13) Linurone      | 20) Mecoprop          |
| 7) Atrazine           | 14) Terbutylazine |                       |

### 10 071 Analysis of Pesticides by Reversed Phase HPLC - II

Column phase: GROM-SIL PE-2 (tailor-made)  
 Eluent A: 1 mM ammonium acetate  
 B: ACN  
 Gradient: 15-55% B (0-55 min)  
 Flow rate: 0.9 ml/min  
 Pressure: 20 MPa  
 Temperature: 40°C  
 Detection (UV): 230 nm  
 Injection: 10 µl (0.5 - 100 µg/ml)

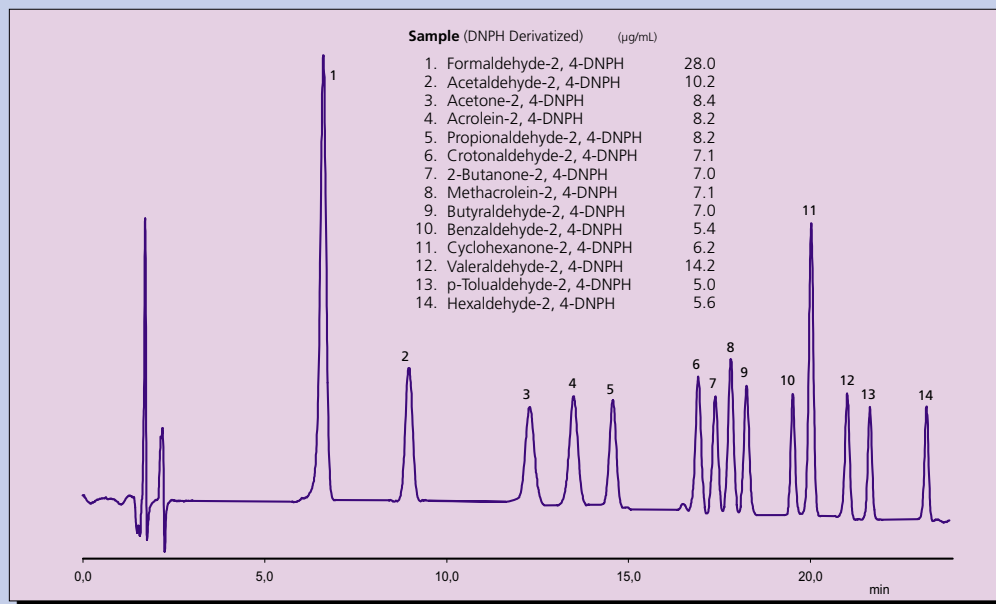
- |                         |                         |                   |
|-------------------------|-------------------------|-------------------|
| 1) Desisopropylatrazine | 10) Methabenzthiazurone | 19) Propazine     |
| 2) Metamitron           | 11) Chlortolurone       | 20) Terbutylazine |
| 3) Fenurone             | 12) Atrazine            | 21) Linurone      |
| 4) Desethylatrazine     | 13) Monolinurone        | 22) Chloroxurone  |
| 5) Crimidine            | 14) Isoproturone        | 23) Prometryne    |
| 6) Metoxurone           | 15) Metobromurone       | 24) Clorpropham   |
| 7) Simazine             | 16) Propham             | 25) Terbutryne    |
| 8) Metribuzine          | 17) Metazachlor         | 26) Metolachlor   |
| 9) Cyanazine            | 18) Sebutylazine        |                   |



Columns	Dimensions	Field of application	Order number
Pesticides I 5 µm, 10% Carbon content	250 x 2 mm cartridge	Environmental analysis	GS PE 1 0512 K 2502
	250 x 4 mm cartridge		GS PE 1 0512 K 2504
Pesticides II 3 µm, 11% Carbon content	250 x 2 mm cartridge	Environmental analysis	GS PE 2 0312 K 2502
	250 x 4 mm cartridge		GS PE 2 0312 K 2504

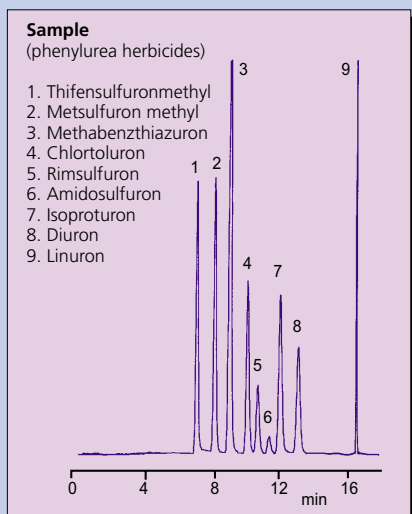
**Note!** All products are also available in standard column hardware. Other dimensions upon request. Reduced prices for refill-columns

## 10 135 Aldehydes and Ketones, Analysis of Auto Emission Mix



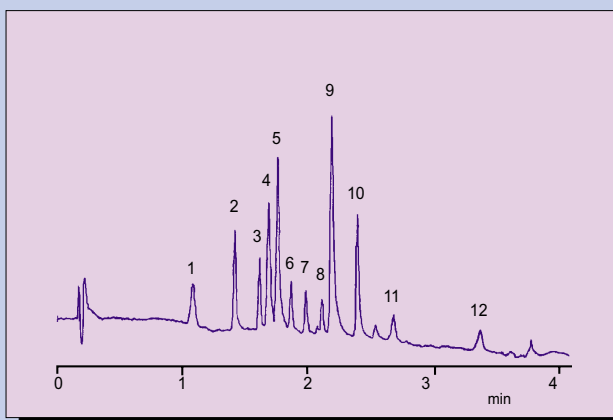
**Column phase:** GROM-SIL AK, 5  $\mu\text{m}$   
**Column size:** 250 x 4 mm  
**Eluent A:** H<sub>2</sub>O  
**B:** ACN / THF = 75 / 25  
**Gradient:** 40% B (0-10 min), 40 - 85% B (10-30 min)  
**Flow rate:** 1.0 ml/min  
**Pressure:** 19.0 MPa  
**Temperature:** RT  
**Detection (UV):** 365 nm  
**Injection:** 10  $\mu\text{l}$  (5 to 30  $\mu\text{g/ml}$  of each)

## 10 134 Analysis of Phenylurea Herbicides



**Column phase:** GROM-SIL PEST-3, 4  $\mu\text{m}$   
**Column size:** 250 x 4 mm  
**Eluent A:** 80  $\mu\text{l}$  H<sub>3</sub>PO<sub>4</sub> (85%) + H<sub>2</sub>O  
**B:** ACN  
**Gradient:** 35% B (0-15 min), 35-80% B (15-20 min),  
**Flow rate:** 1.0 ml/min  
**Pressure:** 17 MPa  
**Temperature:** 18°C  
**Detection (UV):** 220 nm  
**Injection:** 10  $\mu\text{l}$  (10  $\mu\text{g/ml}$  MeOH of each)

## 10 079 High Speed HPLC Analysis of Phenols (EPA)

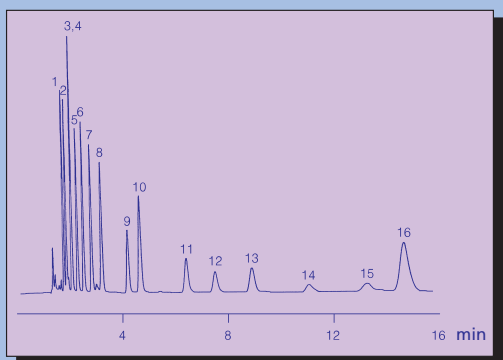


1. Phenol	7. 4-Chloro-3-methyl-phenol
2. 4-Nitrophenol	8. 2,4-Dichlorophenol
3. 2-Chlorophenol	9. 2-Methyl-4,6-dinitro-phenol
4. 2,4-Dinitrophenol	10. 2,3,5-Trichlorophenol
5. 2-Nitrophenol	11. 2,4,6-Trichlorophenol
6. 2,4-Dimethylphenol	12. Pentachlorophenol

**Column phase:** GROM-SIL 100 ODS-2 FE, 1,5 $\mu\text{m}$   
**Column size:** 33 x 4.6 mm  
**Eluent A:** 0,1% TFA in H<sub>2</sub>O  
**B:** ACN  
**Gradient:** 20% B (0-0.17 min), 20-40% B (0.17-0.5 min)  
 40-70% B (0.5-2.83 min), 70-100% B (2.83-3.0 min)  
**Flow rate:** 1.3 ml/min  
**Pressure:** 8 - 27 MPa  
**Temperature:** RT  
**Detection (UV):** 274 nm  
**Injection:** 50  $\mu\text{l}$  (0.04 ppm)

# Polycyclic aromatic hydrocarbons (PAH's)

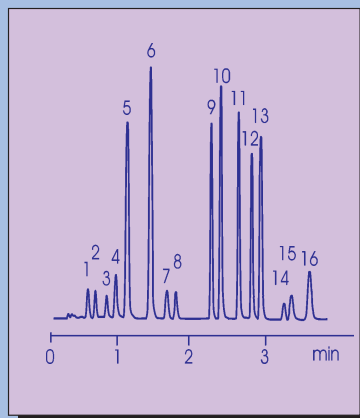
## 10 036 Isocratic Separation of Polycyclic Aromatic Hydrocarbons (PAH's)



Column phase: GROM-SIL PAH -1 (tailor-made)  
 Column size: 250 x 4 mm  
 Eluent: water / ACN = 15 / 85  
 Flow rate: 1.5 ml/min  
 Pressure: 13 MPa  
 Temperature: 25°C  
 Detection (UV): 254 nm  
 Injection: 5 µl (5 µg/ml each)

- |                   |                            |
|-------------------|----------------------------|
| 1) Naphthalene    | 9) Benzo(a)anthracene      |
| 2) Acenaphthylene | 10) Chrysene               |
| 3) Acenaphthene   | 11) Benzo(b)fluoranthene   |
| 4) Fluorene       | 12) Benzo(k)fluoranthene   |
| 5) Phenanthrene   | 13) Benzo(a)pyrene         |
| 6) Anthracene     | 14) Dibenzo(a,h)anthracene |
| 7) Fluoranthene   | 15) Benzo(g,h)perylene     |
| 8) Pyrene         | 16) Ideno(1,2,3,c,d)pyrene |

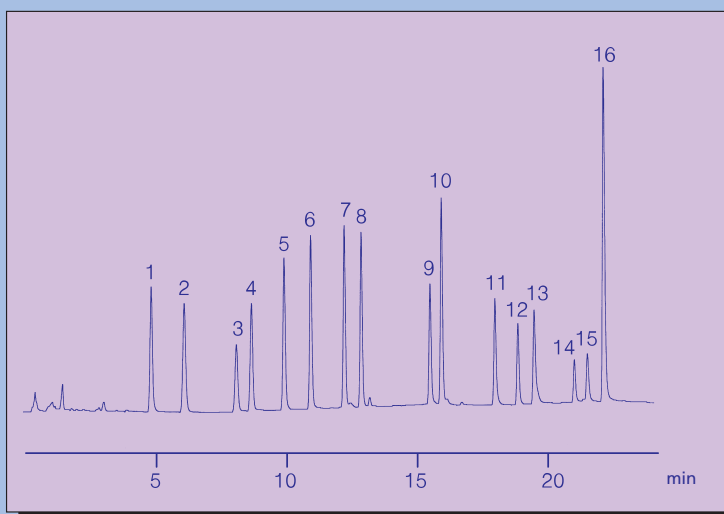
## 10 163 Analysis of Polycyclic Aromatic Hydrocarbons (EPA Standard)



Column phase: GROM-PAH, 3 µm  
 Column size: 50 x 4 mm  
 Eluent A: H<sub>2</sub>O / MeOH = 20 / 80  
 B: ACN  
 Gradient: 10% B (0-0.5 min),  
 100% B (0-1.0 min),  
 100 % B (1.0-4.0 min)  
 Flow rate: 2.0 ml/min  
 Pressure: 16.4 MPa  
 Temperature: RT  
 Detection (UV): 254 nm (1.3 µl flow cell)  
 Injection: 2 µl (10 mg/ml of each)

- 1) Naphthalene
- 2) Acenaphthylene
- 3) Acenaphthene
- 4) Fluorene
- 5) Phenanthrene
- 6) Anthracene
- 7) Fluoranthene
- 8) Pyrene
- 9) Benzo(a)anthracene
- 10) Chrysene
- 11) Benzo(b)fluoranthene
- 12) Benzo(k)fluoranthene
- 13) Benzo(a)pyrene
- 14) Dibenzo(a,h)anthracene
- 15) Benzo(g,h)perylene
- 16) Ideno(1,2,3,c,d)pyrene

## 10 037 Separation of PAH's by Gradient Elution



Column phase: GROM-SIL PAH -1 (tailor-made)  
 Column size: 250 x 4 mm  
 Eluent A: water  
 B: ACN  
 Gradient: 50% B (0-5 min), 50-85% B (5-15 min),  
 85-100% B (15-20 min),  
 100% B (20-25 min)  
 Flow rate: 1.5 ml/min  
 Pressure: 24 MPa  
 Temperature: 25°C  
 Detection (UV): 254 nm  
 Injection: 5 µl (5 µg/ml, each)

- |                   |                            |
|-------------------|----------------------------|
| 1) Naphthalene    | 9) Benzo(a)anthracene      |
| 2) Acenaphthylene | 10) Chrysene               |
| 3) Acenaphthene   | 11) Benzo(b)fluoranthene   |
| 4) Fluorene       | 12) Benzo(k)fluoranthene   |
| 5) Phenanthrene   | 13) Benzo(a)pyrene         |
| 6) Anthracene     | 14) Dibenzo(a,h)anthracene |
| 7) Fluoranthene   | 15) Benzo(g,h)perylene     |
| 8) Pyrene         | 16) Ideno(1,2,3,c,d)pyrene |

Columns	Dimensions	Field of application	Order number
---------	------------	----------------------	--------------

PAH-column for EPA-standard - (separation of the 16 PAH's)	250 x 2 mm cartridge	environmental analysis: soil, pollution (air / water), etc.	GS PA 1 0530 K 2502
	250 x 4 mm cartridge		GS PA 1 0530 K 2504
	50 x 4.6 mm cartridge		GS PA 1 0330 K 0505

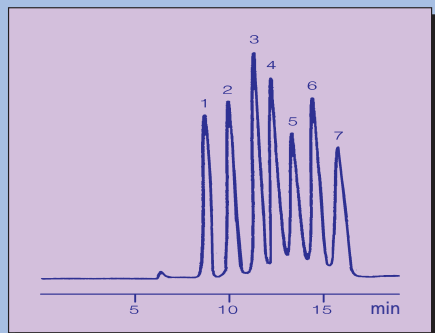
**Note!** All products are also available as columns (complete with end-fittings). Please enquire for other dimensions.  
 Reduced prices for Refill-columns.



**Analysis of beer and wine**

# V. Analysis of beverages and foods

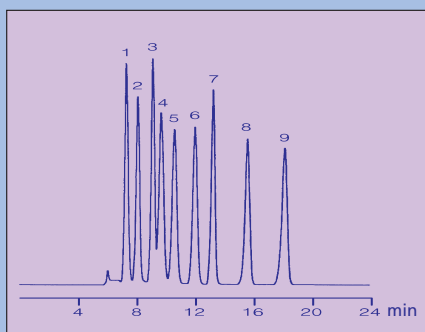
## 10 082 Analysis of Sugars in Beverages



- 1) Raffinose
- 2) Maltose
- 3) Glucose
- 4) Xylose
- 5) Galactose
- 6) Arabinose
- 7) Mannose

Column phase: GROM-RESIN ZP, 10  $\mu$ m  
 Column size: 300 x 8 mm  
 Eluent: water  
 Flow rate: 0.7 ml/min  
 Pressure: 1 MPa  
 Temperature: 70°C  
 Detection: RI  
 Injection: 15  $\mu$ l

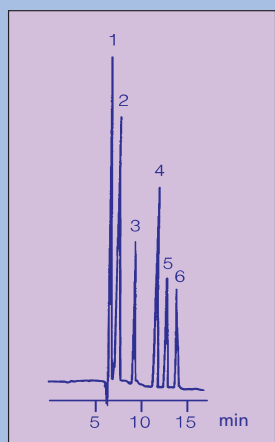
## 10 083 Analysis of Oligosaccharides and Alcohols in Food



- 1) Maltotriose
- 2) Maltose
- 3) Lactulose
- 4) Glucose
- 5) Xylose
- 6) Arabinose
- 7) Adonitol
- 8) Arabitol
- 9) Xylitol

Column phase: GROM-RESIN ZC, 10  $\mu$ m  
 Column size: 300 x 8 mm  
 Eluent: Ca<sub>2</sub>EDTA (50 mg/L H<sub>2</sub>O)  
 Flow rate: 0.7 ml/min  
 Pressure: 1 MPa  
 Temperature: 85°C  
 Detection: RI  
 Injection: 15  $\mu$ l

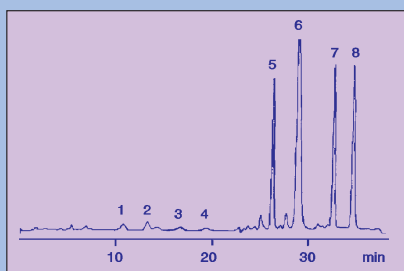
## 10 084 HPLC Determination of Organic Acids



- 1) Oxalic acid
- 2) Maleic acid
- 3) Malonic acid
- 4) Succinic acid
- 5) Formic acid
- 6) Acetic acid

Column phase: GROM-RESIN AC, 10  $\mu$ m  
 Column size: 300 x 8 mm  
 Eluent: 0.003 N sulfuric acid  
 Flow rate: 0.7 ml/min  
 Pressure: 7 MPa  
 Temperature: RT  
 Detection: conductivity  
 Injection: 20  $\mu$ l

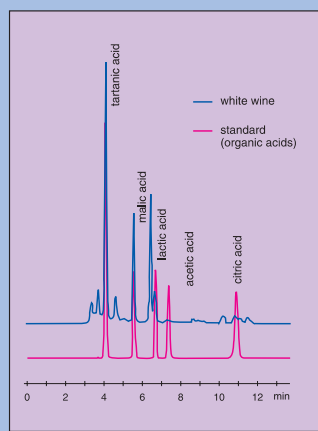
## 10 100 Determination of the Hop Bitter Acids in Beer by HPLC



- 1) Co-Isohumulon
- 2) N-Isohumulon
- 3) Ad-Isohumulon
- 4) Xanthohumulon
- 5) Co-Humulon
- 6) N/Ad-Humulon
- 7) Co-Lupulon
- 8) N/Ad-Lupulon

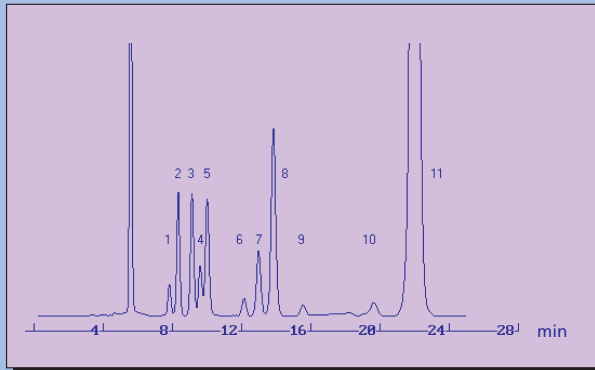
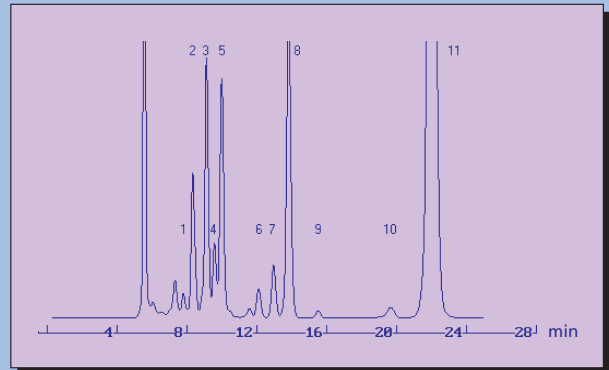
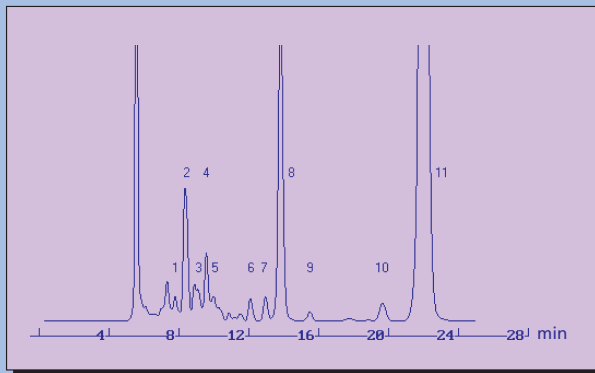
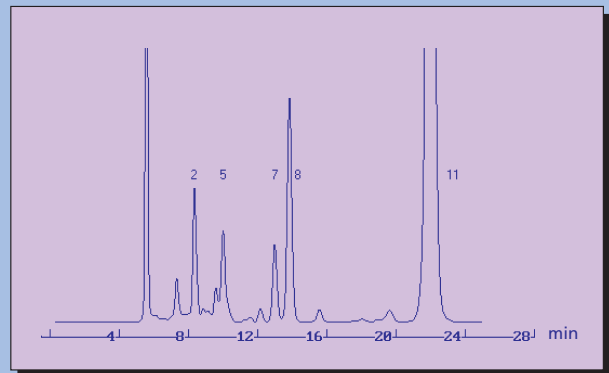
Column phase: GROM-Beer-Bitter (tailor-made)  
 Column size: 125 x 4 mm  
 Eluent A: MeOH  
 B: 647 ml MeOH + 349 ml H<sub>2</sub>O + 4 ml H<sub>3</sub>PO<sub>4</sub>  
 Gradient: 100% B (0-19.5 min), 65% B (19.5-29 min), 50% B (29-36 min), 100% B (36-40 min)  
 Flow rate: 1.0 ml/min  
 Pressure: 9 MPa  
 Temperature: 35°C  
 Detection (UV): 270 / 314 nm  
 Injection: 10  $\mu$ l beer

## 10 137 Analysis of Organic Acids in White Wine



Column phase: GROM-SIL ,Org. Acids', 5  $\mu$ m  
 Column size: 250 x 4 mm  
 Eluent: 20 mM Na-phosphate, pH 2.8  
 Flow rate: 0.5 ml/min  
 Pressure: 9.5 MPa  
 Temperature: RT  
 Detection (UV): 220 nm  
 Injection: 20  $\mu$ l (0.1 to 0.2  $\mu$ g/ml of each)

# Analysis of wines by HPLC

**10 085 a Wine Standard**

**10 085 b Red Wine (sweet)**

**10 085 c Red Wine (dry)**

**10 085 d White Wine with Biological Degradation of Acids**


**Column phase:** GROM-RESIN ZH, 10 µm + guard column  
**Column size:** 300 x 8 mm  
**Eluent:** 2.5 mM H<sub>2</sub>SO<sub>4</sub>  
**Flow rate:** 0.6 ml/min  
**Pressure:** 1MPa  
**Temperature:** 60°C  
**Detection:** RI  
**Sample:** wine, diluted 1:10 with 10 mM H<sub>2</sub>SO<sub>4</sub>

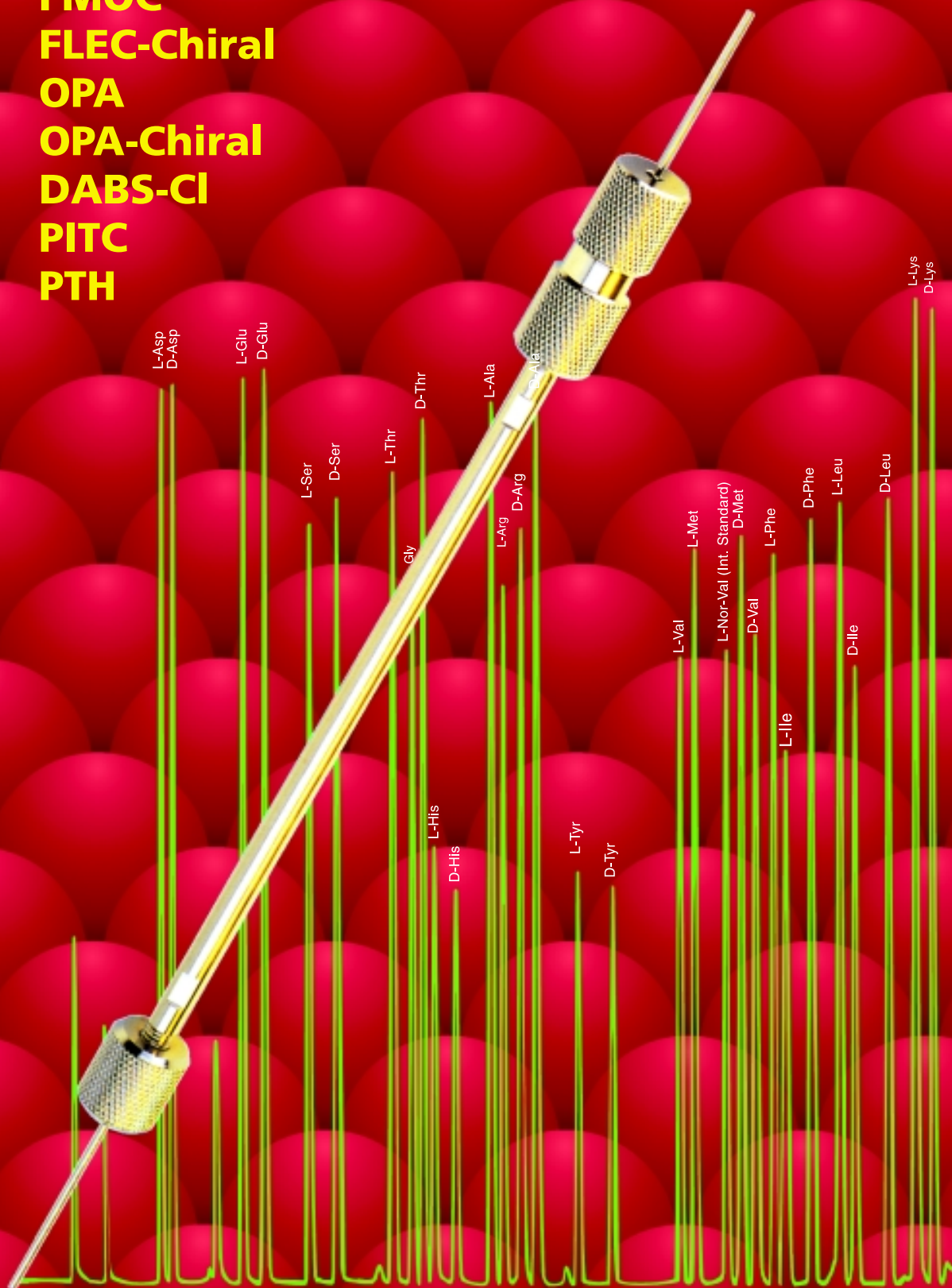
- |                  |                    |
|------------------|--------------------|
| 1) Citric acid   | 7) Lactic acid     |
| 2) Tartaric acid | 8) Glycerol        |
| 3) Glucose       | 9) Acetic acid     |
| 4) Malic acid    | 10) 2,3-Butanediol |
| 5) Fructose      | 11) Ethanol        |
| 6) Succinic acid |                    |

Analysis of	Field of application *	Column dimensions	Order number
Monosaccharides	Foodstuff industry, Nutrition sciences	300 x 8 mm column	GP ZP 1 1012 S 3008
Mono- and disaccharides, sugar alcohols	Fermentation control/ breweries	300 x 8 mm column	GP ZC 1 1012 S 3008
Sugars, alcohols, organic acids	Beverage industry (Viticulture / Enology)	300 x 8 mm column	GP ZH 1 1012 S 3008
Organic acids	Beverage industry	300 x 8 mm column	GP AC 1 1012 S 3008
Hop bitter acids	Beverage industry	125 x 4 mm column	GS BI 1 0712 S 1204

\* Further applications concerning the analysis of beverages and food see also pages 19–22

# Amino Acid Analysis by HPLC

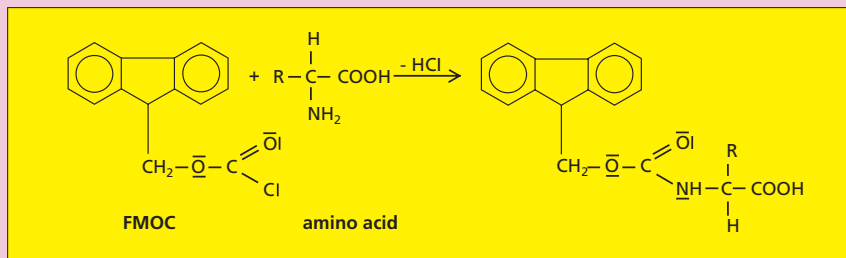
FMOC  
FLEC-Chiral  
OPA  
OPA-Chiral  
DABS-Cl  
PITC  
PTH



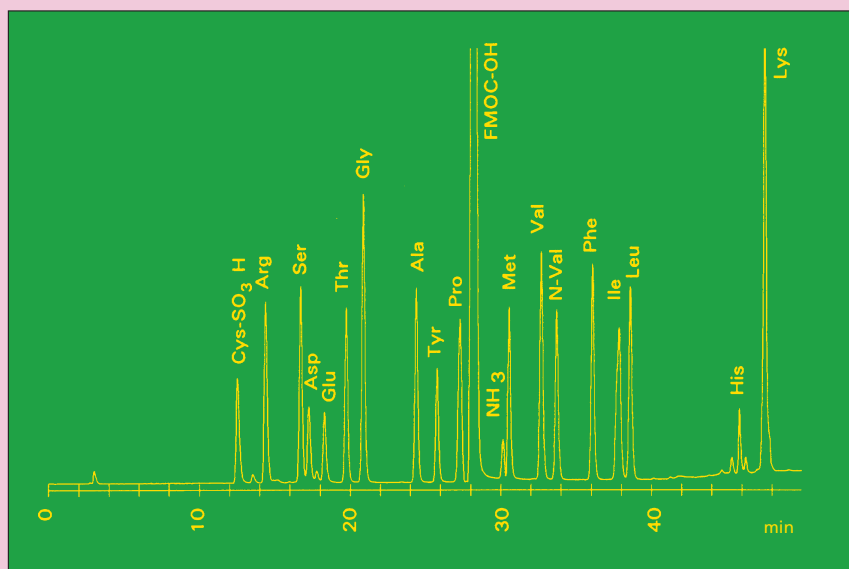
# Amino acid analysis by precolumn derivatisation using **FMOC/ADAM**

9-fluorenyl-methoxycarbonyl chloride / 1-aminoadamantane

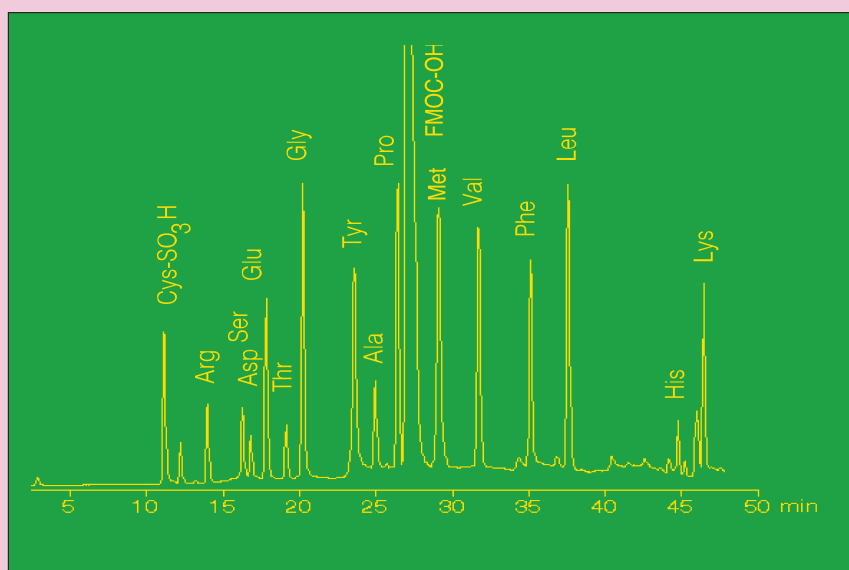
- ➔ High resolution and high sensitivity
- ➔ Rapid, simple derivatisation
- ➔ Primary and secondary amines
- ➔ Stable derivatives
- ➔ Fully automated or manual derivatisation



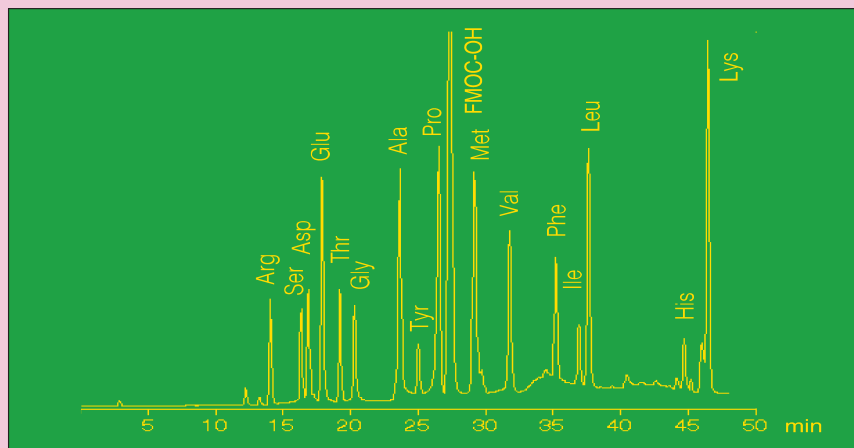
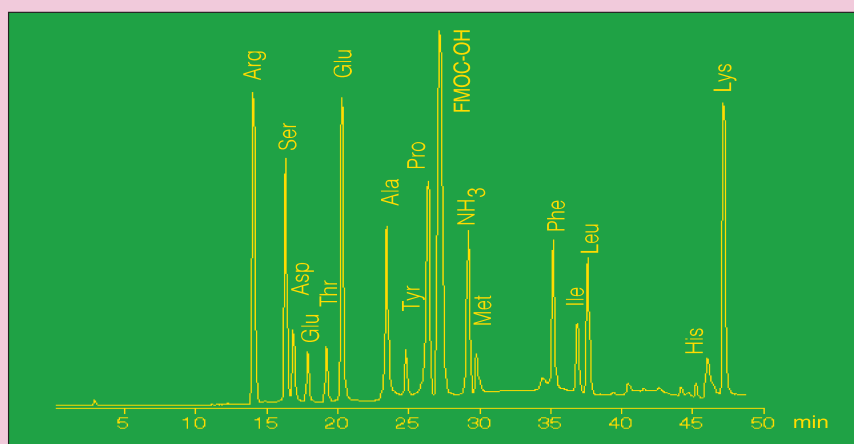
## 10 054 Protein Hydrolysate Standard (6 N HCl / 15 hrs)



## 10 055 Amino Acid Analysis - $\beta$ -Chain of Insulin (hydrol. with 6 N HCl / 15 hrs)



**Column phase:**  
 GROM-SIL FMOC-2  
**Column size:**  
 250 x 4 mm  
**Eluent A:**  
 50 mM Na-acetate, pH 4.2 / ACN = 80 / 20  
**Eluent B:**  
 50 mM Na-acetate, pH 4.2 / ACN = 20 / 80  
**Gradient:**  
 0-40% B (0-35 min),  
 40-70% B (35-45 min),  
 70-100% B (45-50 min)  
**Flow rate:**  
 1.0 ml  
**Pressure:**  
 17 MPa  
**Temperature:**  
 40°C  
**Detection (Fluor.):**  
 263 nm (exc.), 313 nm (em.)  
**Injection:**  
 10  $\mu$ l (2  $\mu$ M, each a. a.)

**10 056 Amino Acid Analysis of Bovine Serum Albumin (hydrolyzed with 6 N HCl, 15 hrs)****10 057 Amino Acid Analysis of Human Urotilatin (hydrol. with 6 N HCl, 15 hrs)****References**

I. Betner, P. Földi, LC+GC 6, 832 - 840 (1988)

B. Gustavsson, I. Betner, J. of Chromatogr. 507, 67-77 (1990)

J. Maier-Rosenkranz, A. Maisch, A. Kupka, P. Földi, LC+GC INT. 7, 509-516 (1994)

Derivatisation instructions, E.Grom, Application Service 001

**Columns and reagent kits****Complete kit**

**984.0000** Complete kit including 4 mm i.d. special column as a cartridge, all necessary reagents and detailed working instructions for amino acid analysis by precolumn derivatisation with FMOC/ADAM.(consisting of order nos. GS FM2 0512K2504, GS OD2 2010V0204, GS FM2 0512V0104V, 2100, 4100, 900.0001, 900.0101, 984.0500, 984.0600)

**Columns\* and single items for reordering**

<b>GS FM2 0512K2501</b>	tailor-made, customised 250 x 1.0 mm analytical FMOC column (cartridge)	<b>900.0000</b>	L-amino acid standard solution, 17 amino acids (ala, arg, asp, (cys) <sub>2</sub> ** , glu, gly, his, ile, leu, lys, met, phe, pro, ser, thr, tyr, val); 2.5 µMol/ml each / ** = 1.25 µMol/ml, 1 ml
<b>GS FM2 0512K2502</b>	tailor-made, customised 250 x 2 mm FMOC Microbore column (cartridge)	<b>900.0001</b>	L-amino acid standard solution (17 amino acids; 2.5 µMol/ml each), 10 x 1 ml
<b>GS FM2 0512K2503</b>	tailor-made, customised 250 x 3 mm analytical FMOC column (cartridge)	<b>900.0100</b>	L-norvaline (2.5 µMol/ml), as internal standard, 1 ml
<b>GS FM2 0512K2504</b>	tailor-made, customised 250 x 4 mm analytical FMOC column (cartridge)	<b>900.0101</b>	L-norvaline (2.5 µMol/ml), as internal standard, 10 x 1ml
<b>GS OD2 2010V0204</b>	Clean-up precolumn (20 x 4 mm)	<b>984.0500</b>	1-amino-adamantane (ADAM/HCl), 1 g (to be dissolved in a solution of borate buffer and acetone; see instruction sheet)
<b>2100</b>	guard column holder for clean-up guard column	<b>984.0600</b>	FMOC-reagent II (100 ml)
<b>GS FM2 0512V0104V</b>	5 Guard columns (10 x 4 mm)		
<b>4100</b>	Guard column combination		

The FMOC/pentane column and reagent kit has the order number 981.0000, see application number 10 130, page 40

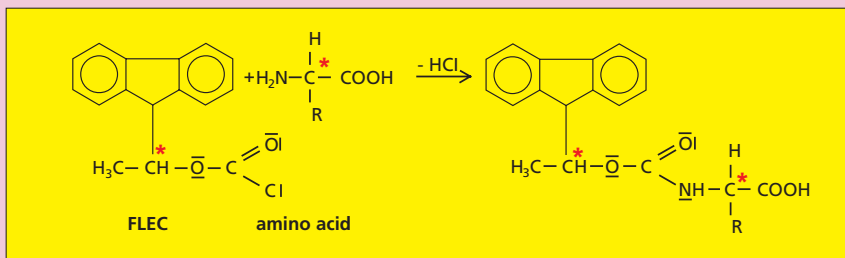
\* Cartridges and Columns of other dimensions, e.g., capillary columns, available upon request

## Separation and analysis of **D-** and **L-amino** acids and other optically active amines by precolumn derivatisation with

### **FLEC/ADAM** or **EVE**

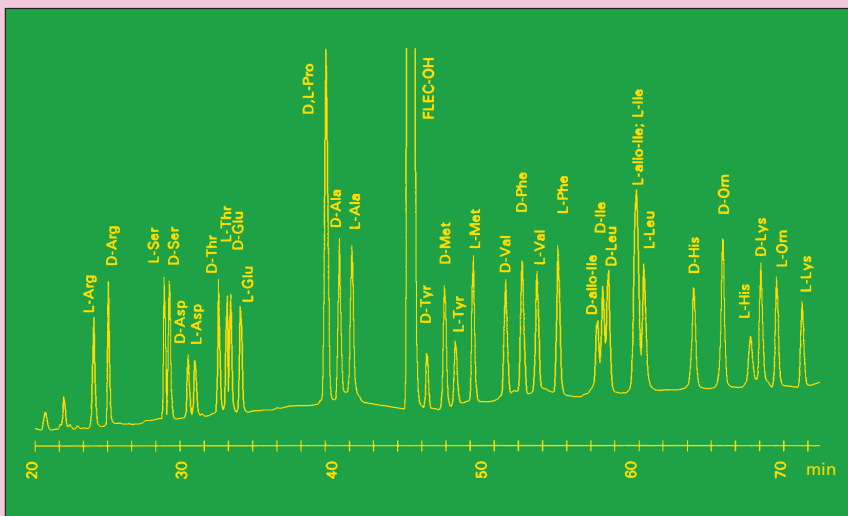
**(+)-1-(9-fluorenyl)ethyl chloroformate / 1- aminoadamantane or glycine**

- ➔ Separation of all D- and L-amino acids
- ➔ Primary and secondary amino acids
- ➔ High sensitivity
- ➔ Simple, fully automated (or manual) derivatisation
- ➔ High resolution



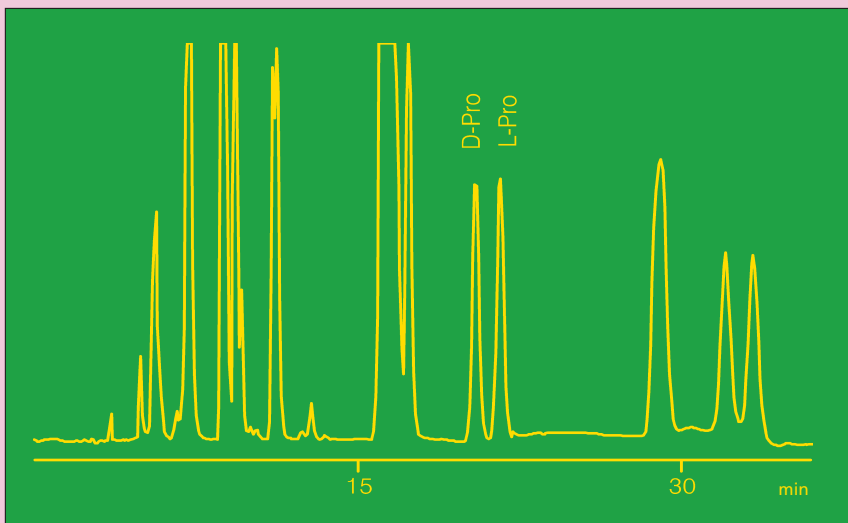
#### 10 058 a Separation of a D-, L-Amino Acid Standard by HPLC employing the FLEC-ADAM Approach

Column phase:  
GROM-SIL FLEC-1  
Column size:  
250 x 4 mm  
Eluent A:  
50 mM Na-acetate, pH 4.0  
B: ACN C: THF  
Gradient:  
17% B + 8% C (0-8 min),  
17-30% B + 8-0 % C (8-22 min),  
30-50% B + 0% C (22-70 min)  
Flow rate:  
0.75 ml/min  
Pressure:  
24 MPa  
Temperature:  
40°C  
Detection (Fluor.):  
263 nm (exc.), 313 nm (em.)  
Injection:  
10 µl (10 nMol/ml, each a.a. 10 µM)

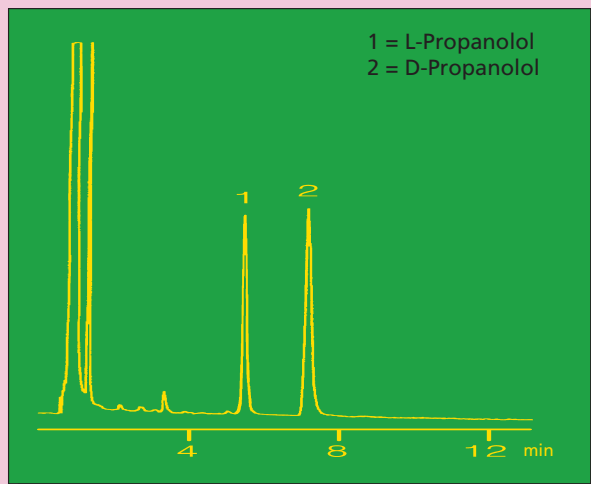


#### 10 058 b Isocratic Separation of D- and L-Proline after Precolumn Derivatization with FLEC/ADAM

Column phase:  
GROM-SIL FLEC-1  
Column size:  
250 x 4 mm  
Eluent:  
50 mM Na-acetate, pH 4.0 /  
ACN = 55 / 45  
Flow rate:  
0.75 ml/min  
Pressure:  
24 MPa  
Temperature:  
40°C  
Detection(Fluor.):  
263 nm (exc.), 313 nm (em.)  
Injection:  
10 µl (each a.a. 10 µM)



## 10 053 a Determination of Propranolol - Analysis of Diastereomers of $\beta$ -Blockers in a pill



Column phase:  
GROM-SIL 100 ODS-2 FE  
Column size:  
125 x 4 mm  
Eluent:  
water / acetonitrile = 30 / 70  
Flow rate:  
1.2 ml/min  
Pressure:  
6 MPa  
Temperature:  
RT  
Detection (Fluor.):  
263 nm (exc.), 313 nm (em.)  
Injection:  
1  $\mu$ l (= 500 fmol)

### References

S. Einarsson, B. Josefsson,  
P. Möller, D. Sanchez, *Anal. Chem*  
59, 1191-1195 (1987)

J. Maier-Rosenkranz, A. Maisch,  
A. Kupka, P. Földi, *LC+GC INT.* 7,  
509-516 (1994)

Derivatisation instructions,  
E.Grom, Application Service 002

## Columns and reagent kits

### Complete kit

**985.0000** Complete kit including 4 mm i.d. special column as cartridge, all necessary reagents and detailed working instructions for analysis of DL-amino acids and other chiral amines by precolumn derivatisation with FLEC/ADAM.or FLEC/EVE (consisting of order nos. GS FL1 0312K2504, GS OD2 2010V0204, GS FL1 0312V0104V, 2100, 4100, 900.0101, 984.0500, 985.0400, 985.0600, 985.1000).

### Columns\* and single items for re-ordering

GS FL1 0312K2501	tailor-made, customised 250 x 1 mm FLEC/ADAM analytical column (cartridge)
GS FL1 0312K2502	tailor-made, customised 250 x 2 mm FLEC/ADAM Microbore column (cartridge)
GS FL1 0312K2503	tailor-made, customised 250 x 3 mm FLEC/ADAM analytical column (cartridge)
GS FL1 0312K2504	tailor-made, customised 250 x 4 mm FLEC/ADAM analytical column (cartridge)
GS OD2 2010V0204	Clean-up precolumn (20 x 4 mm)
2100	Guard column holder for clean-up guard column
GS FL1 0312V0104V	5 Guard columns (10 x 4 mm)
4100	Guard column combination
900.0100	L-norvaline (2.5 $\mu$ Mol/ml), as internal standard, 1 ml
900.0101	L-norvaline solution (2.5 $\mu$ Mol/ml), as internal standard, 10 x 1 ml
984.0500	1-aminoadamantane (ADAM/HCl), 1 g. (to be dissolved in a solution of borate buffer and acetone; see instruction sheet)
985.0400	FLEC reagent (5mg/ml), 1ml
985.0600	Glycine - EVE -, 1g (to be dissolved in a solution of borate buffer and acetone; see instruction sheet)
985.1000	DL- amino acid standard solution (16 pairs): ala, arg, asp, glu, his, ile, leu, lys, met, orn, phe, pro, ser, thr, tyr, val; 2.5 $\mu$ Mol/ml each, 5 x 1 ml
985.2000	DL- amino acid standard (24 diastereomeric pairs of amino acids, 100 mg of each): ala, arg, asn, asp, cit, cys, dopa, glu, gly, his, ile, leu, lys, met, nor-leu, nor-val, orn, phe, pro, ser, thr, trp, tyr, val

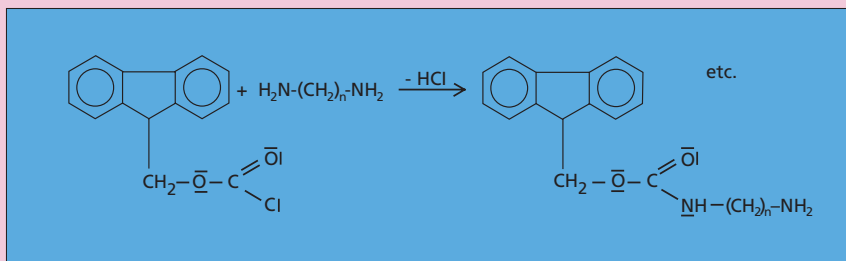
\* Cartridges and Columns of other dimensions, e.g., capillary columns, upon inquiry

## Analysis of **polyamines** and **biogenic amines** (such as cadaverine, putrescine, spermine, spermidine, histamine, etc.) by precolumn derivatisation with

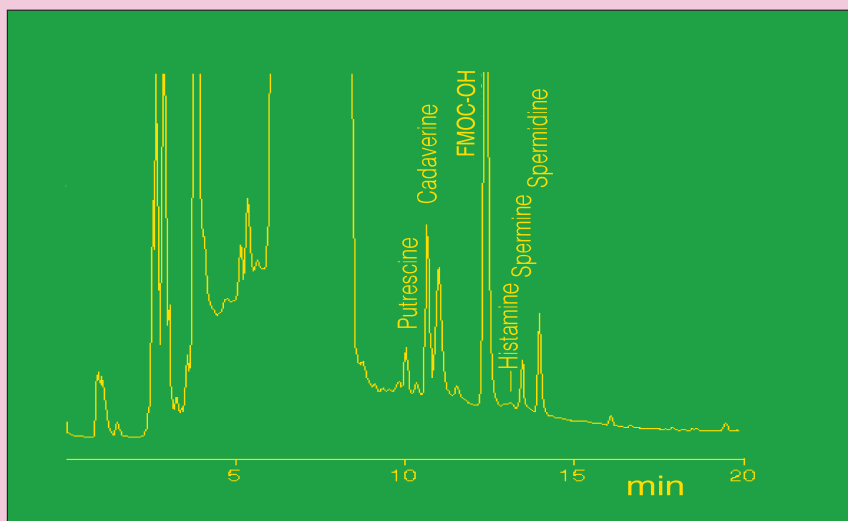
### **FMOC/EVE**

#### 9-fluorenyl-methoxycarbonyl chloride / glycine

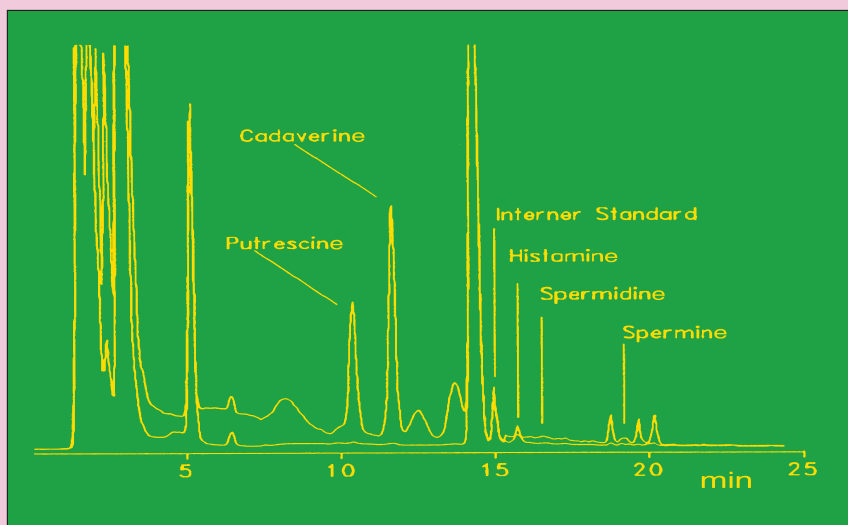
- ➔ Shortest times of analysis
- ➔ Low limits of detection (in femto-Mol range)
- ➔ Simple to perform (no special sample preparation necessary)
- ➔ Stable derivatives
- ➔ Manual or automatic derivatisation



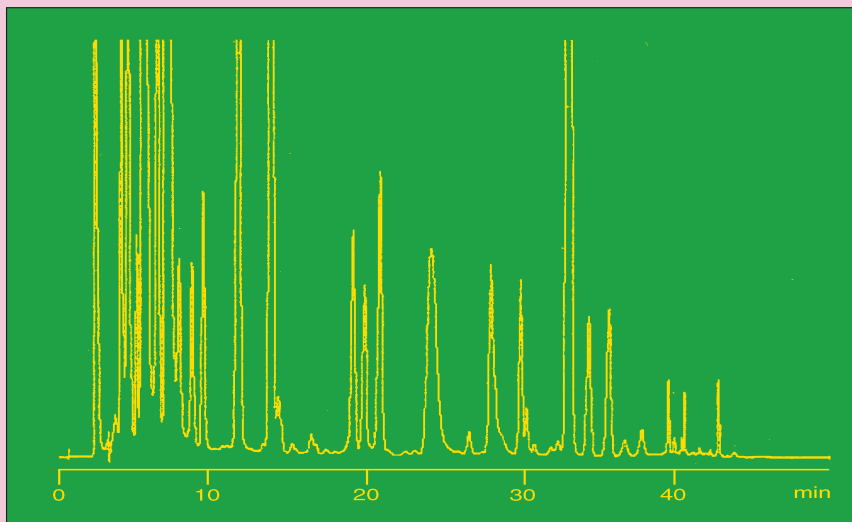
#### 10 059 Determination of Polyamines in Decaying Fish Fillet applying Precolumn Derivatization with FMOC/EVE and HPLC



#### 10 060 Analysis of Polyamines in Fresh and in Spoiled Meat (pork) by Precolumn Derivatization with FMOC/EVE



**Column phase:**  
 GROM-SIL Polyamine-1, 5  $\mu$ m  
**Column size:**  
 200 x 4 mm  
**Eluent A:**  
 50 mM Na-acetate, pH 4.2 / ACN = 80 / 20  
**Eluent B:**  
 50 mM Na-acetate, pH 4.2 / ACN = 5 / 95  
**Gradient:**  
 50% B (0-5 min), 50-100% B (5-20 min),  
 100% B (20-25 min)  
**Flow rate:**  
 1.3 ml/min  
**Pressure:**  
 10.8 MPa  
**Temperature:**  
 40°C  
**Detection (Fluor.):**  
 263 nm (exc.), 310 nm (em.)  
**Injection:**  
 10  $\mu$ l (0.25  $\mu$ mol/ml of each)

**10 103 Analysis of polyamines in meat employing the FMOC/EVE approach**

**Column phase:**  
GROM-SIL Polyamine-2

**Column size:**  
250 x 4 mm

**Eluent A:**  
water / acetic acid / ACN = 400/3/100

**Eluent B:**  
water / acetic acid / ACN = 25/3/475

**Gradient:**  
40% B (0-5 min), 40-50% B (5-15 min), 50% B (15-20 min), 50-65% B (20-27.5 min), 65% B (27.5-35 min), 65-100% B (35-38 min), 100% B (38-50 min)

**Flow rate:**  
1.0 ml/min

**Pressure:**  
15 MPa

**Temperature:**  
40°C

**Detection (Fluor.):**  
263 nm (exc.), 310 nm (em.)

**Injection:**  
10 µl (meat extract)

**References**

J. Maier-Rosenkranz, A. Maisch, A. Kupka, P. Földi, LC+GC INT. 7, 509-516 (1994)

Derivatisation instructions, E.Grom, Application Service 003

**Columns and reagent kits****Complete kit**

**983.0000** Complete kit including 4 mm i.d. special column as cartridge, all necessary reagents and detailed working instructions for analysis of polyamines and biogenic amines by precolumn derivatisation with FMOC/EVE (consisting of order nos. GS PO1 0510K2004, GS OD2 2010V0204, GS PO1 V0104V, 2100, 4100, 981.0600, 983.0001, 983.5000, 985.0600).

**Columns\* and single items for re-ordering**

<b>GS PO1 0510K2001</b>	tailor-made, customised 200 x 1 mm POLYAMINE analytical column (cartridge)
<b>GS PO1 0510K2002</b>	tailor-made, customised 200 x 2 mm POLYAMINE Microbore column (cartridge)
<b>GS PO1 0510K2003</b>	tailor-made, customised 200 x 3 mm POLYAMINE analytical column (cartridge)
<b>GS PO1 0510K2004</b>	tailor-made, customised 200 x 4 mm POLYAMINE analytical column (cartridge)
<b>GS OD2 2010V0204</b>	Clean-up precolumn (20 x 4 mm)
<b>2100</b>	Guard column holder for clean-up guard column
<b>GS PO1 0510V0104V</b>	5 Guard columns (10 x 4 mm)
<b>4100</b>	Guard column combination
<b>981.0600</b>	FMOC reagent I (200 ml)
<b>983.0000</b>	Polyamine standard solution (putrescine, cadaverine, spermine, spermidine, histamine; 2.5 µMol/ml each), 1ml
<b>983.0001</b>	Polyamine standard solution (putrescine, cadaverine, spermine, spermidine, histamine; 2.5 µMol/ml each), 10 x 1ml
<b>983.5000</b>	1,8-diamino octane solution (1 µMol/ml) as internal standard, 100 ml concentrate
<b>985.0600</b>	Glycine (EVE), 1g, (to be dissolved in a solution of borate buffer and acetone; see instruction sheet)

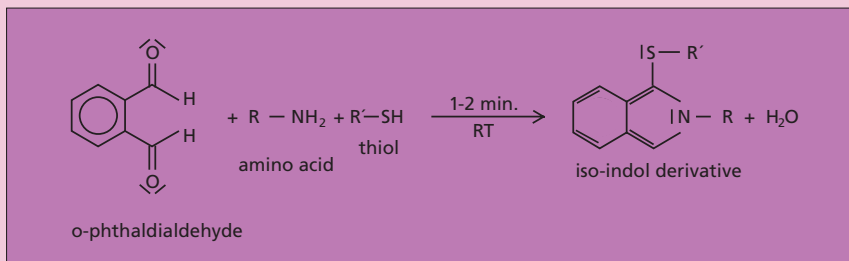
\* Cartridges and Columns of other dimensions, e.g., capillary columns, available upon request

## Analysis of **amino acids** by precolumn derivatisation with

### OPA/3-MPA

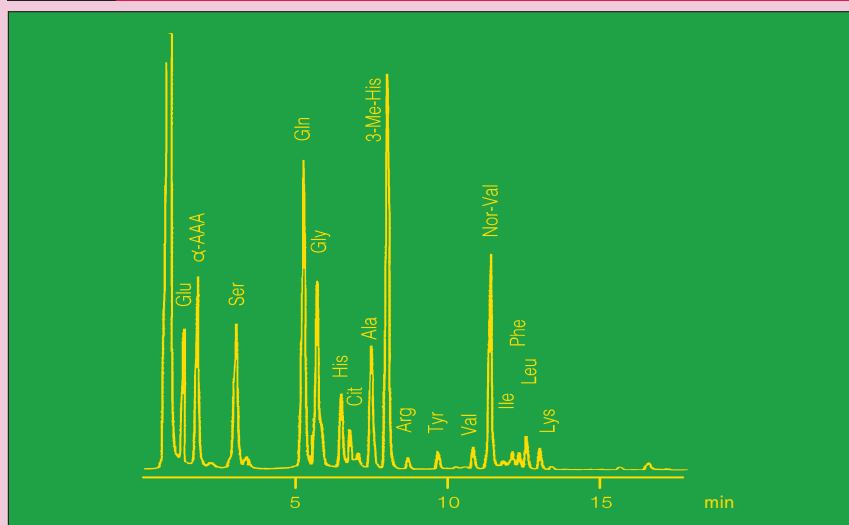
ortho-phthaldialdehyde / 3-mercaptopropionic acid

- ➔ Highest sensitivity (5-10 fMol)
- ➔ Shortest time of analysis
- ➔ Fully automated derivatisation
- ➔ Best resolution
- ➔ Highly reliable



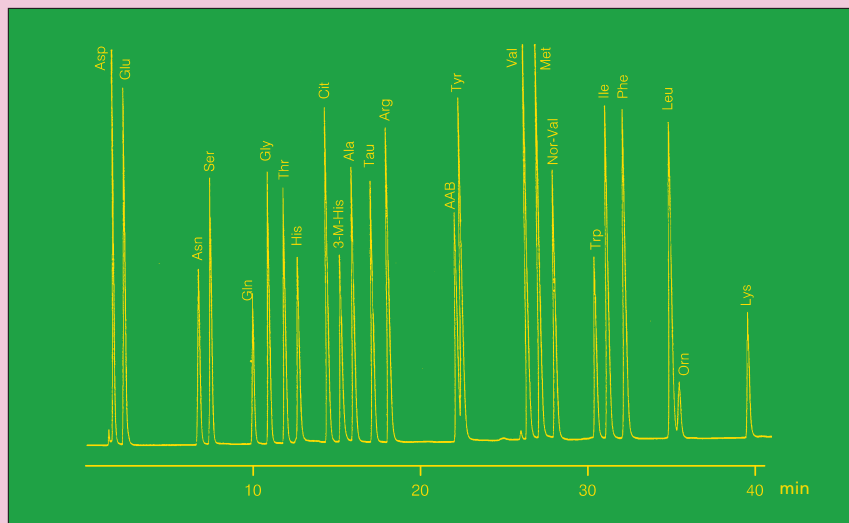
#### 10 061 Amino Acid Analysis of Liver Biopsy Sample using OPA for Precolumn Derivatization

**Column phase:**  
GROM-SIL OPA-1  
**Column size:**  
125 x 4 mm  
**Eluent A:**  
12.5 mM Na-phosphate, pH 7.2 /  
ACN = 97 / 3  
**Eluent B:**  
12.5 mM Na-phosphate, pH 7.2 /  
ACN = 50 / 50  
**Gradient:**  
0-20% B (0-8 min), 20-55%  
B (8-15 min)  
**Flow rate:**  
1.1 ml/min  
**Pressure:**  
21 MPa  
**Temperature:**  
RT  
**Detection (Fluor.):**  
330 nm (exc.), 450 nm (em.)  
**Injection:**  
20 µl (= 10 pmol, each a.a.)

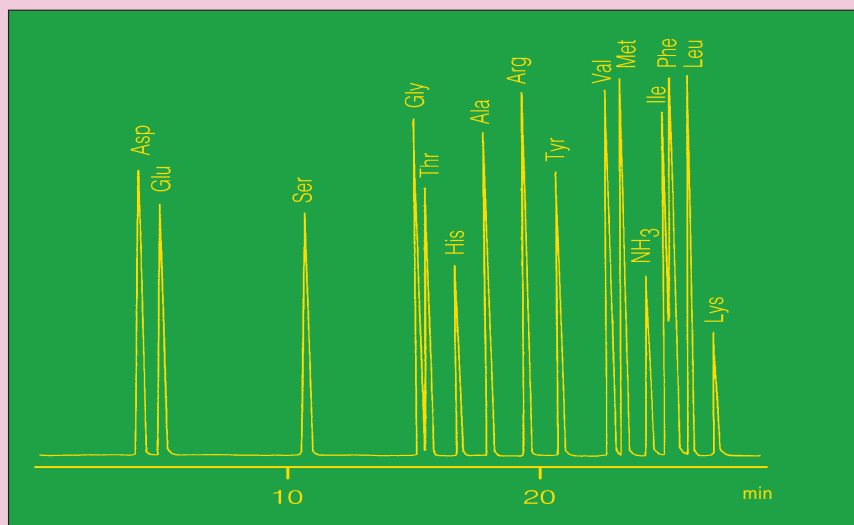


#### 10 062 Amino Acid Analysis after Precolumn Derivatization with OPA/Mercaptopropionic Acid - Extended Standard -

**Column phase:**  
GROM-SIL OPA-1  
**Column size:**  
250 x 4 mm  
**Eluent A:**  
25 mM Na-phosphate, pH 7.2 / THF = 995 / 5  
**Eluent B:**  
25 mM Na-phosphate, pH 7.2 / MeOH /  
ACN = 50 / 35 / 15  
**Gradient:**  
0% B (0-3 min), 0-35% B (3-20 min),  
35-50% B (20-25 min),  
50-60% B (25-36 min),  
60-70% B (36-40 min), 70-100% B (40-43 min)  
**Flow rate:**  
0.8 ml/min  
**Pressure:**  
24 MPa  
**Temperature:**  
25°C  
**Detection (Fluor.):**  
330 nm (exc.), 450 nm (em.)  
**Injection:**  
10 µl (= 10 pmol, each a.a.)



## 10 063 High Sensitivity Amino Acid Analysis of Protein Hydrolysate by Microbore-HPLC after Precolumn Derivatisation with OPA



**Column phase:**  
GROM-SIL OPA-1  
**Column size:**  
250 x 1 mm  
**Eluent A:**  
12.5 mM Na-phosphate, pH 7.2 / ACN / MeOH = 97/0.5 / 2.5  
**Eluent B:**  
12.5 mM Na-phosphate, pH 7.2 / ACN / MeOH = 70 / 25 / 5  
**Gradient:**  
0-100% B (0-20 min), 100% B (20-30min)  
**Flow rate:**  
0.08 ml/min  
**Pressure:**  
30 MPa  
**Temperature:**  
30°C  
**Detection (Fluor.):**  
330 nm (exc.), 450 nm (em.)  
**Injection:**  
1 µl (= 5-10 fmol, each a.a.)

### References

H. Godel, T. A. Graser, P. Földi, P. Pfänder, P. Fürst, J. of Chromatogr. 297, 49-61 (1984)

T. A. Graser, H. Godel, S. Anders, P. Földi, P. Fürst, Anal. Biochem. 151, 142-152 (1985)

Derivatisation instructions, E.Grom, Application Service 004

## Columns and reagent kits

### Complete kit

**980.0000** Complete kit including 4.6 mm i.d. special column as cartridge, all necessary reagents and detailed working instructions for amino acid analysis by precolumn derivatisation with OPA/3-MPA (consisting of order nos. GS OP1 0308K1505, GS OD2 2010V0405, GS OP1 0308V0105V, 2100, 4100, 900.0001, 900.0101, 980.0600, 981.0520, 981.0530).

### Columns\* and single items for re-ordering

<b>GS OP1 0308K1501</b>	tailor-made, customised 150 x 1 mm OPA analytical column (cartridge)
<b>GS OP1 0308K1502</b>	tailor-made, customised 150 x 2 mm OPA Microbore column (cartridge)
<b>GS OP1 0308K1503</b>	tailor-made, customised 150 x 3 mm OPA analytical column (cartridge)
<b>GS OP1 0308K1504</b>	tailor-made, customised 150 x 4 mm OPA analytical column (cartridge)
<b>GS OD2 2010V0204</b>	Clean-up precolumn (20 x 4.0 mm)
<b>2100</b>	Guard column holder for clean-up guard column
<b>GS OP1 0308V0104V</b>	5 Guard columns (10 x 4.0 mm)
<b>4100</b>	Guard column combination
<b>900.0000</b>	L-amino acid standard solution, 17 amino acids (ala, arg, asp. (cys) <sub>2</sub> ***, glu, gly, his, ile, leu, lys, met, phe, pro, ser, thr, tyr, val); 2.5 µMol/ml each / ***= 1.25 µMol/ml, 1 ml
<b>900.0001</b>	L-amino acid standard solution (17 amino acids; 2.5 µMol/ml each), 10 x 1 ml
<b>900.0100</b>	L-norvaline (2.5 µMol/ml), as internal standard, 1 ml
<b>900.0101</b>	L-norvaline (2.5 µMol/ml), as internal standard, 10 x 1ml
<b>980.0546</b>	Borate buffer (1M, pH 10.7) for high sensitive microanalysis, 200 ml
<b>981.0520</b>	Borate buffer (1M, pH 10.7)
<b>981.0530</b>	Solution for deproteinisation (30% w/v 5-sulfosalicylic acid containing 1.02 mM L-norvaline solution (internal standard), 100ml
<b>980.0600</b>	OPA reagent, 20 ml of 10x stock solution

\* Cartridges and Columns of other dimensions, e.g. capillary columns, available upon request

# High-sensitivity determination of D- and L- amino acids after precolumn derivatisation with

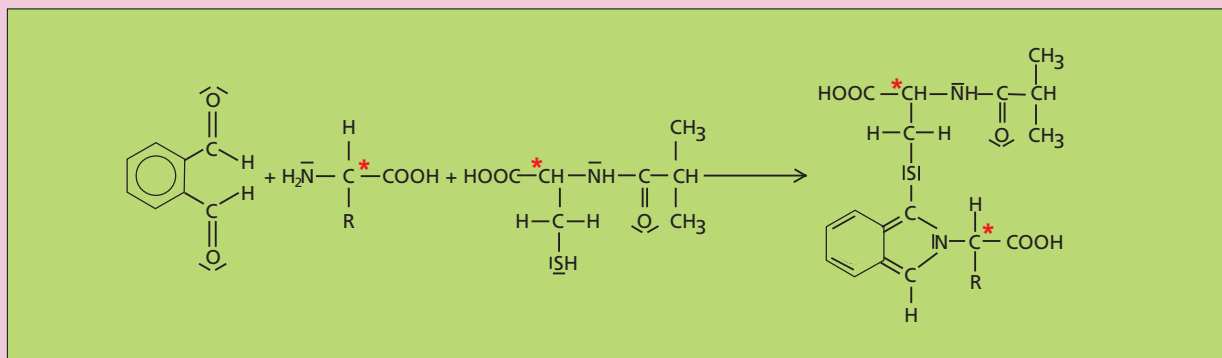
## OPA/IBLC

ortho-Phthaldialdehyde / N-isobutyryl-L-cysteine

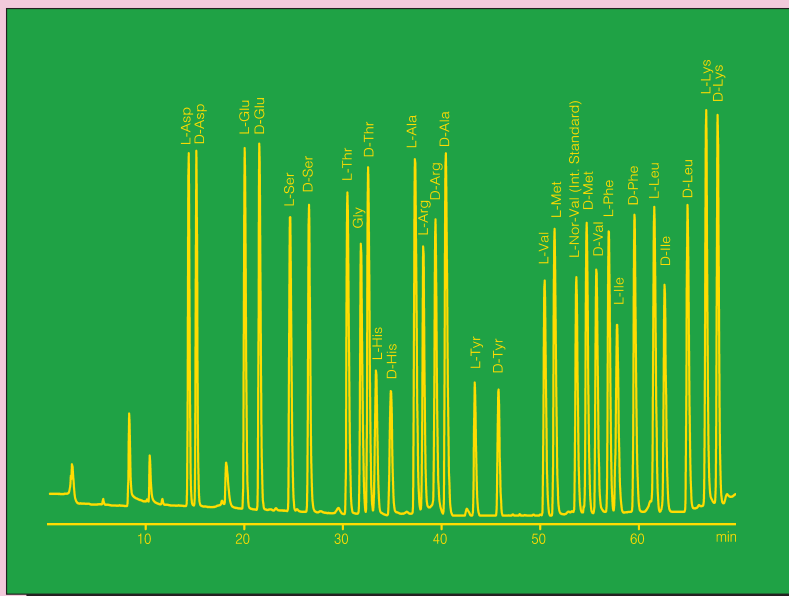
High resolution (both optical antipodes of practically all protein amino acids in a single chromatogram)

Fully automated, simple handling  
Very high reproducibility of the results

Outstandingly high sensitivity (fMol range)  
Extraordinarily long lifetimes of columns



### 10 064 Determination of the D- and L-Amino Acids after Precolumn Derivatisation with OPA / N-Isobutyryl-L-cysteine



Column phase: GROM-SIL OPA-2  
 Column size: 250 x 4 mm  
 Eluent A: 23 mM Na-acetate, pH 6.0  
 B: 600 ml MeOH + 50 ml ACN  
 Gradient: 0-53% B (0-75 min)  
 Flow rate: 0.8 ml/min  
 Pressure: 18 MPa  
 Temperature: 24°C  
 Detection (Fluor.): 230 nm (exc.), 445 nm (em.)  
 Injection: 10 µl (= 50 pmol, each a.a.)

### References

H. Brückner, R. Wittner, H. Godel, *Chromatographia* 32, 383-388 (1991)

H. Brückner, P. Jack, M. Langer, H. Godel, *Amino-Acids* 2, 271-284 (1992)

H. Brückner, S. Haasmann, M. Langer, T. Westhauser, R. Wittner, H. Godel, *J. of Chromatogr. A* 666, 259-273 (1994)

H. Brückner, T. Westhauser, *Chromatographia*, 39 419-426 (1994)

Derivatization instructions, E. Grom, Application Service 005

## Columns and reagent kits

### Complete kit

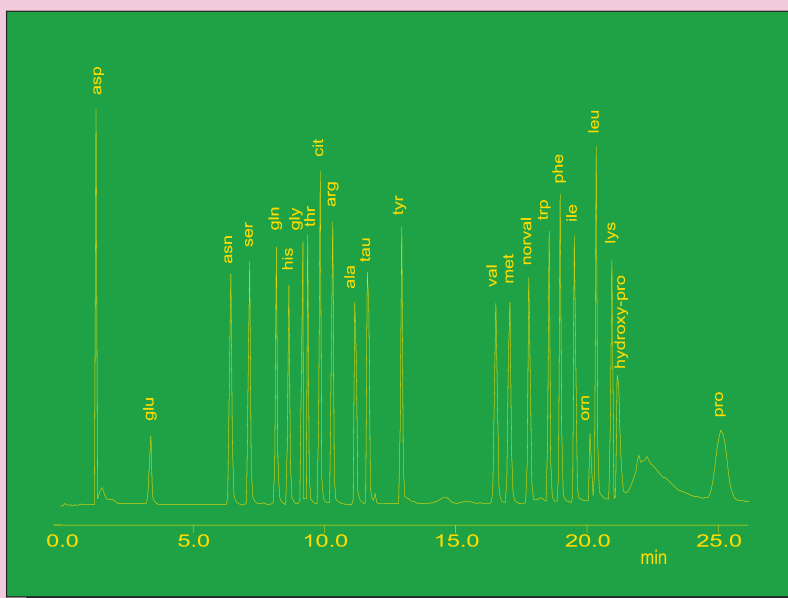
**986.0000** Complete kit including 4 mm i.d. special column as cartridge, all necessary reagents and detailed working instructions for analysis of DL-amino acids after precolumn derivatisation with OPA/IBLC (consisting of order nos. GS OP2 0512K2504, GS OD2 2010V0404, GS OP2 0512V0104V, 2300, 4100, 900.0101; 981.0520; 981.0530, 986.0600, 986.1000)

### Columns\* and single items for re-ordering

<b>GS OP2 0512K2501</b>	tailor-made, customised 250 x 1 mm OPA analytical column (cartridge)
<b>GS OP2 0512K2502</b>	tailor-made, customised 250 x 2 mm OPA Microbore column (cartridge)
<b>GS OP2 0512K2503</b>	tailor-made, customised 250 x 3 mm OPA analytical column (cartridge)
<b>GS OP2 0512K2504</b>	tailor-made, customised 250 x 4 mm OPA analytical column (cartridge)
<b>GS OD2 2010V0204</b>	Clean-up precolumn (20 x 4 mm)
<b>2100</b>	Guard column holder for clean-up guard column
<b>GS OP2 0512V0104V</b>	5 Guard columns (10 x 4 mm)
<b>4100</b>	Guard column combination
<b>900.0001</b>	L-amino acid standard solution, 17 amino acids (ala, arg, asp, (cys) <sub>2</sub> **, glu, gly, his, ile, leu, lys, met, phe, pro, ser, thr, tyr, val), 2.5 µMol/ml each / ** = 1.25 µMol/ml, 10 x 1 ml
<b>900.0100</b>	L-norvaline (2.5 µMol/ml), internal standard 1 ml
<b>900.0101</b>	L-norvaline (2.5 µMol/ml), internal standard, 10 x 1 ml
<b>981.0520</b>	Borate buffer (1M, pH 10.7)
<b>981.0530</b>	Solution for the deproteinization of proteins (30% w/v 5-sulfosalicylic acid in 1.02 mM L-norvaline solution (internal standard), 100 ml)
<b>985.2000</b>	DL- amino acid standard (24 diastereomeric pairs of amino acids, 100 mg of each)- ala, arg, asn, asp, cit, cys, dopa, glu, gly, his, ile, leu, lys, met, nor-leu, nor-val, orn, phe, pro, ser, thr, trp, tyr, val -
<b>986.0600</b>	OPA-chiral reagent (10ml of concentrate, to be diluted 1:10)
<b>986.1000</b>	DL- amino acid standard solution, - ala, arg, asp, glu, gly, his, ile, leu, lys, met, L-nor-val, phe, ser, thr, tyr, val: 2.5 µMol/ml each, 5 x 1 ml

**New!** **987.0000** Complete kit including 4 mm i.d. special column as cartridge, all necessary reagents and detailed working instructions for analysis of amino acids after precolumn derivatisation with OPA/3-MPA.

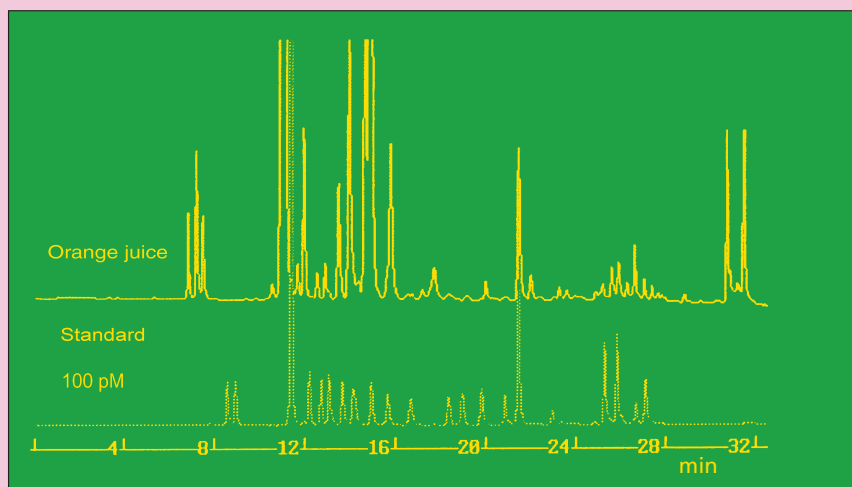
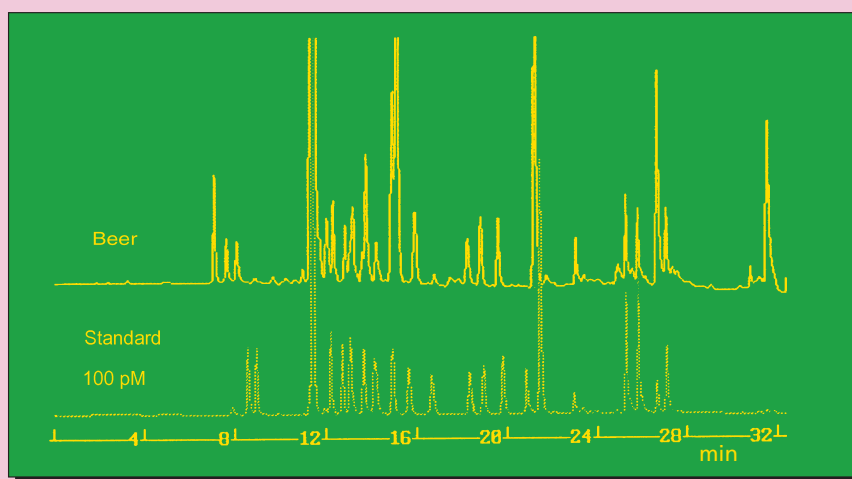
### 10 165 Analysis of Primary and Secondary Amino Acids by Precolumn Derivatisation with OPA and FMOC



**Column phase:** GROM-SIL OPA-3  
**Column size:** 125 x 4 mm  
**Eluent:** 25 mM Na-Phosphate, pH 7.2 / THF = 99.2 / 0.8  
**Gradient:** 0% B (0-2 min), 0-50% B (2-10 min), 50-60% B (10-15 min), 60-100% B (15-20 min), 100% B (20-25 min)  
**Flow rate:** 1.1 ml / min  
**Pressure:** 29 MPa  
**Temperature:** RT  
**Detection (Fluor.):** 330 nm (exc.), 450 nm (em.), after lys (~22 min)  
**Injection:** 10 µl (10 pmol, each a.a.)

\* Cartridges and Columns of other dimensions, e.g. capillary columns, available upon request



**10068c Determination of Amino Acids in Urine by HPLC after Precolumn Derivatisation with DABS-Cl****10068d Determination of Amino Acids in Beer by HPLC after Precolumn Derivatisation with DABS-Cl****References**

J. Y. Chang, P. Martin, R. Bernasconi, D. G. Braun, FEBS Lett. 132, 117-120 (1981)

J. Y. Chang, R. Knecht, D. G. Braun, Biochem.J. 199, 547-555 (1981)

Derivatisation instructions, E.Grom, Application service 006

**Columns and reagent kits****Complete kit**

**982.0000** Complete kit including 4.6 mm i.d. special column as cartridge, all necessary reagents and detailed working instructions for analysis of amino acids by precolumn derivatisation with DABS-Cl (consisting of order nos. GS DA1 0410K2005, GS OD2 2010V0405, GS DA1 0410V0105V, 2100, 4100, 900.0001, 982.0101, 982.0600).

**Columns\* and single items for re-ordering**

**GS DA1 0410K2001** tailor-made, customised 200 x 1 mm DABS analytical column (cartridge)

**GS DA1 0410K2002** tailor-made, customised 200 x 2 mm DABS Microbore column (cartridge)

**GS DA1 0410K2003** tailor-made, customised 200 x 3 mm DABS column analytical (cartridge)

**GS DA1 0410K2004** tailor-made, customised 200 x 4 mm DABS analytical column (cartridge)

**GS OD2 2010V0204** Clean-up precolumn (20 x 4 mm)  
**2100** Guard column holder for clean-up guard column

**GS DA1 0410V0104V** 5 Guard columns (10 x 4 mm)

**4100** Guard column combination

**900.0000** L-amino acid standard solution, 17 amino acids (ala, arg, asp, (cys)<sub>2</sub>\*\*\*, glu, gly, his, ile, leu, lys, met, phe, pro, ser, thr, tyr, val), 2.5 µMol/ml each / \*\*\*= 1.25 µMol/ml, 1 ml

**900.0001** L-amino acid standard solution (17 amino acids; 2.5 µMol/ml each), 10 x 1 ml

**982.0100** S-Carboxyethyl-L-cysteine, internal standard solution, (2.5 µMol/ml), 1 x 1 ml

**982.0101** S-Carboxyethyl-L-cysteine, internal standard solution, (2.5 µMol/ml), 10 x 1 ml

**982.0600** DABS-Cl reagent, 10 vials, 1.3 mg each

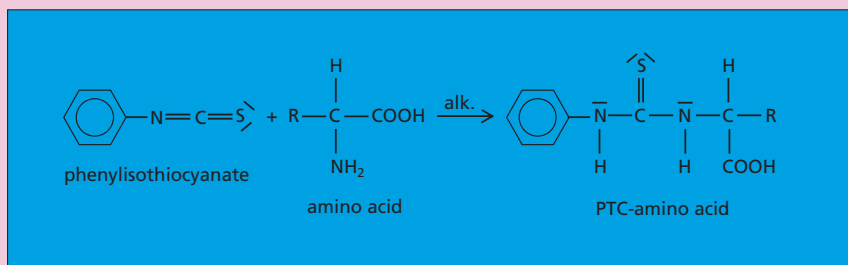
\* Cartridges and Columns of other dimensions, e.g. capillary columns, available upon request

## Amino acid analysis after precolumn derivatisation with

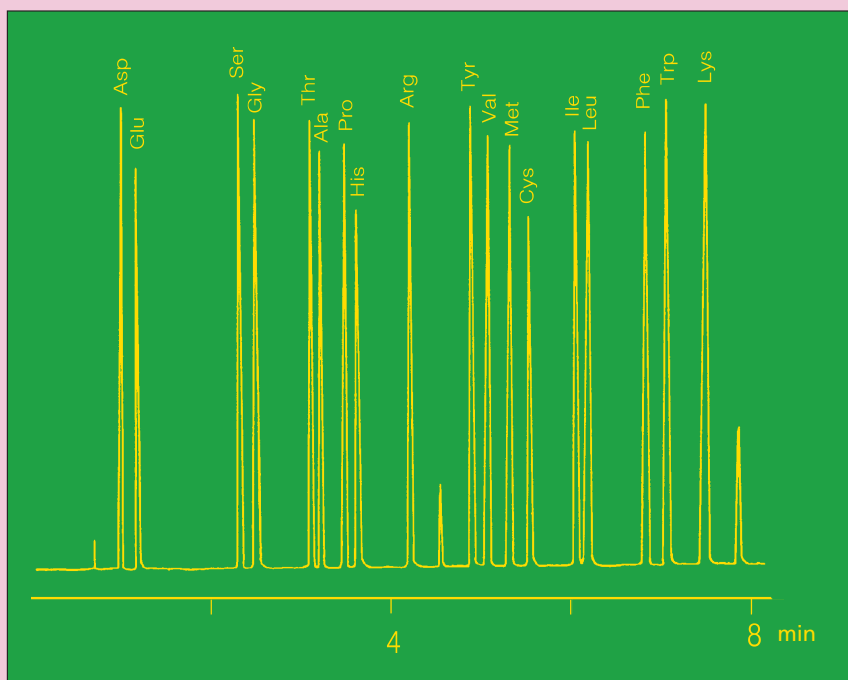
### PITC

#### Phenylisothiocyanate

- Fast separations
- High resolution
- Can be automated
- Stable derivatives
- Simple UV detection at 254 nm



### 10 065 Amino acid analysis by precolumn derivatisation with PITC



**Column phase:** GROM-SIL 80 ODS-2 FE, 3  $\mu$ m  
**Column size:** 125 x 4 mm (with 10 mm guard column)  
**Eluent A:** 50 mM Na-acetate, pH 6.5  
**B:** 50 mM Na-acetate, pH 6.5 / ACN = 50 / 50  
**Gradient:** 0-45% B (0-8 min), 45-100% B (8-10 min)  
**Flow rate:** 1.2 ml/min  
**Pressure:** 15 MPa  
**Temperature:** 55°C  
**Detection (UV):** 254 nm, 0.01 AUFS  
**Injection:** 20  $\mu$ l (~100 pmol each a. a.)

#### References

P. Edman, A. Henschen, „Determination in Protein Sequence“, 2nd ed., (S. B. Needleman, ed.), Springer Verlag, Berlin, (1975)

R. L. Heindrikson, S.C. Meredith, Anal. Biochem. 135, 65-74 (1984)

B. A. Bidlingmeyer, S. A. Cohen, T. L. Tarvin., J. of Chromatogr. 336, 93-104 (1984)

## Protein sequencing (Edman-degradation) with HPLC-determination of the PTH-Amino acids

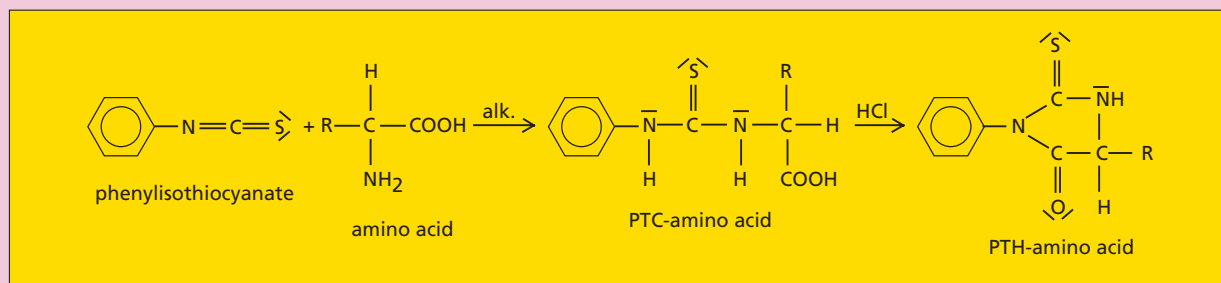
### Phenylthiohydantoin

High sensitivity  
(limit of detection  
 $\leq 100$  fMol)

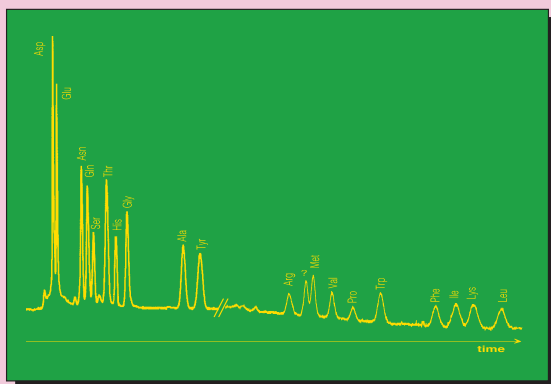
Simple and reliable  
separation of all amino  
acids under either  
isocratic or gradient  
elution conditions

Short times of  
analysis ( $\leq 15$  min)  
Long life-times of  
columns

Simple handling of  
microbore or  
capillary column  
hardware  
(fingertight)



#### 10 066 Isocratic PTH-Amino Acid Analysis by Capillary HPLC



**Column phase:**  
Superspher C 8 endc., 4  $\mu\text{m}$   
**NovoGROM Capillary column:**  
250 mm x 300  $\mu\text{m}$   
**Eluent:**  
21 mM Na-acetate, pH 4.9 /  
ACN / 1,2-dichloroethane =  
68.5/31/0.5- v/v  
**Flow rate:**  
0.04 ml/min  
**Pressure:**  
21 MPa  
**Temperature:**  
60°C  
**Detection (UV):**  
264 nm, 0.005 AUFS  
**Injection:**  
5  $\mu\text{l}$  ( $\sim 3$  pmol, each a. a.)

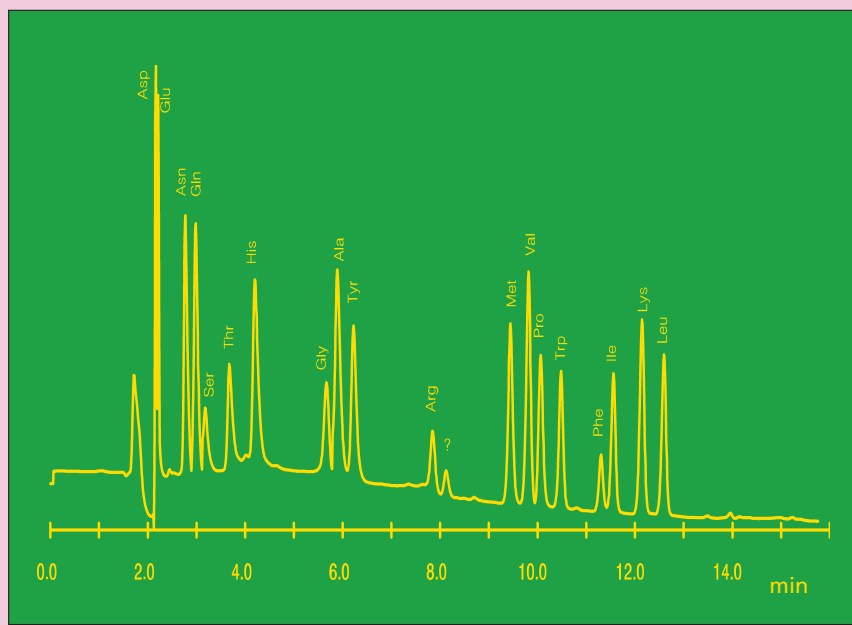
#### References

P. Edman, Acta Chem. Scand. 4, 283 ff (1949)

F. Lottspeich, Hoppe-Seyler's Z. Physiol. Chem. 361, 1829-1834 (1980)

F. Lottspeich, J. of Chromatogr, 326, 321-327 (1985)

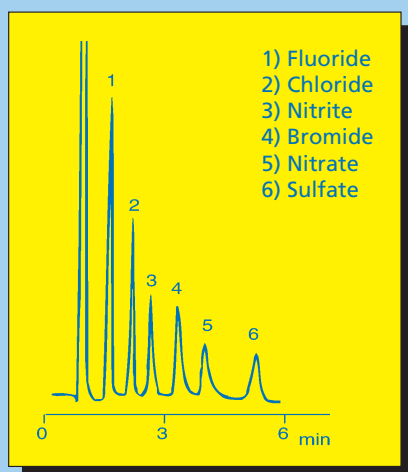
#### 10 067 PTH-Amino Acid Analysis by HPLC applying Gradient Elution



**Column phase:**  
Superspher C 8 endc., 4  $\mu\text{m}$   
**NovoGROM-Column:**  
250 x 4 mm  
**Eluent A:**  
21 mM Na-acetate, pH 4.9  
**Eluent B:**  
ACN / 1,2-dichloroethane = 993 / 7  
**Gradient:**  
30% B (0-1 min),  
30-80% B (1-25 min)  
**Flow rate:**  
1 ml/min  
**Pressure:**  
19 MPa  
**Temperature:**  
60°C  
**Detection (UV):**  
254 nm  
**Injection:**  
10  $\mu\text{l}$  ( $\sim 3$  pmol, each a. a.)

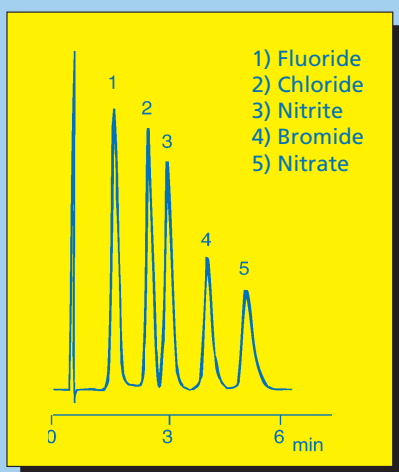
# PEEK HPLC Columns

- **fully biocompatible, nevertheless stable up to 40 MPa**
  - ➔ to satisfy even the highest demands of sophisticated biochemical applications
- **all wetted surfaces made from PEEK**
  - ➔ inert against high salt concentrations, even halide-containing buffers
- **stainless steel threads**
  - ➔ countless refilling with any of the stationary phases listed in the HPLC catalogue
- **finger-tight hardware**
  - ➔ convenient, easy to use (without any tools)
- **Low dispersion system with integrated guard columns**
  - ➔ always guarantees high resolution and maximum peak symmetry



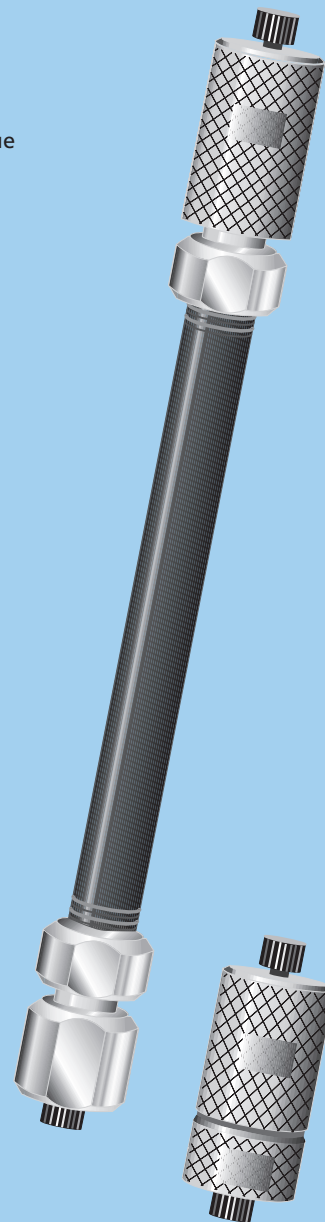
## Determination of anions by indirect UV-detection

Column phase: GROM-Anion-1, 10  $\mu\text{m}$   
 Column size: PEEK column 150 x 4.0  
 Eluent: 2.0 mM potassium hydrogen phthalate, pH 6.0  
 Gradient: 5–50% B (0–12 min)  
 Flow rate: 1.2 ml/min  
 Injection: 100  $\mu\text{l}$  (10 ppm)  
 Detection (UV): 280 nm (indirect)



## Determination of anions by conductivity detection

Column phase: GROM-Anion-1, 10  $\mu\text{m}$   
 Column size: PEEK column 150 x 4.0  
 Eluent: 2.0 mM sodium benzoate pH 6.5  
 Flow rate: 2.5 ml/min  
 Injection: 100  $\mu\text{l}$  (10 ppm)  
 Detection: Conductivity

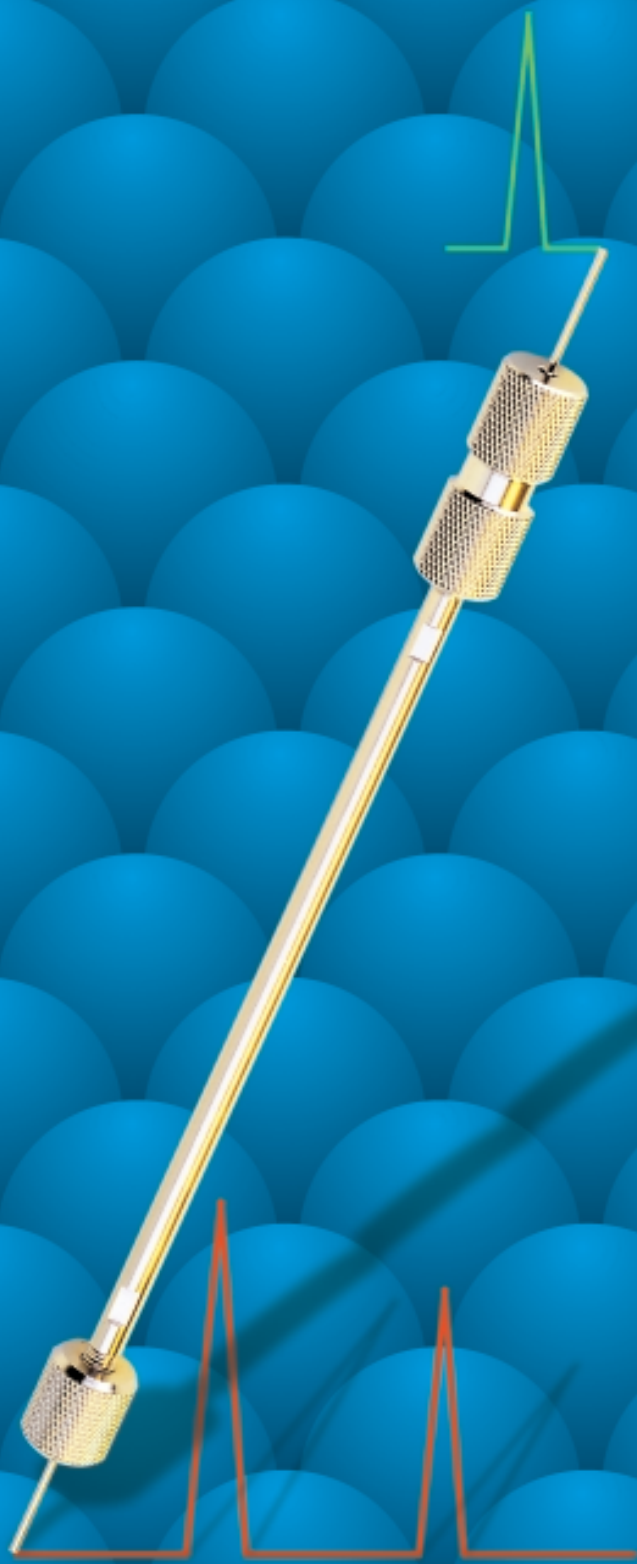


Guard-column holder can be used either as a sample enrichment column or for any guard column connected in the traditional way.

## PEEK HPLC Column System

- Column inner diameter 4.0 mm
- Guard columns 10 and 20 mm in length
- Guard column head for direct, dead volume free coupling of columns and guard columns
- Guard column holder

# CMR-500



**Column choice for chiral separations**

# CHIRA-GROM Phases for the separation of chiral mole

## I. NovoGROM column hardware for chiral separations

In order to increase sensitivity, to decrease costs by saving solvents and for environmental protection tailor-made, customized **CHIRA-GROM** matrices are packed in the low dispersion **NovoGROM** microbore columns. This well-designed, excellent column hardware performs outstandingly in all, even highly sophisticated, chiral separations. There are three versions of microbore columns packed with **CHIRA-GROM**-Phases available:

- **Standard microbore column** (250 x 2 mm) - connected to the HPLC-system via 1/16" capillaries, ferrules and compression screws
- **Low dispersion microbore cartridge** (250 x 2 mm) - with endfitting adapters and column heads (quick-connectors)
- **Microbore guard column combination** (250 x 2 mm column and 10 x 2 mm guard column) - with endfitting adapters, spacer and guard column head

or as a novel alternative:

**CHIRA-GROM** phases packed in the unique, **NovoGROM** capillary columns, with fingertight fittings

Standard capillary column - length 250 mm and 200, 300, 500 or 800  $\mu$ m i.d.

Capillary column (length 250 mm) with integrated guard column - (length 5 or 20 mm) both columns with 200, 300, 500 or 800  $\mu$ m i.d.

For further informations concerning NovoGROM HPLC column hardware, see pages 99-111

## II. Five different CHIRA-GROM matrices are available:

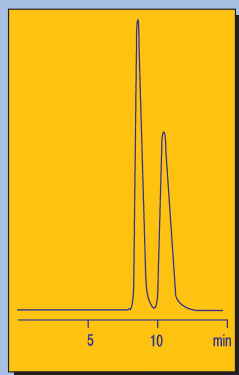
**CHIRA-GROM** Phases Type 1-4 and 9 consist of spherical, highly porous 8  $\mu$ m silica particles specially treated by a novel thermal process and covered with layers of synthetic chiral polymers. They are stable up to 35 MPa and may be used from pH 1 to 8 at temperatures of 0-80°C. With these high-performance materials, separations of chiral molecules can easily be achieved in the normal phase, as well in the reversed phase mode. For **NovoGROM Method Development Sets** for chiral separations see pages 132 and 133.

There are five major advantages of working in the reversed phase mode, i.e., using polar solvents to separate chiral molecules:

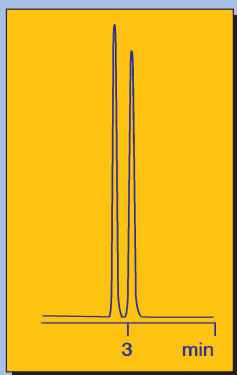
- 1) After sample dilution, crude biological samples from conventional matrices can be applied directly, for instance, by column switching.
- 2) Up to now, polar chiral molecules insoluble in hydrophobic phases such as heptane etc. could not be separated. However, now they can be dissolved in polar mobile phases and therefore are easily separated in the reversed phase mode.
- 3) Gradient elution is simple in the reversed phase mode.
- 4) For many separations, better values of "a", i. e., relative retention may be achieved.
- 5) Column lifetime is generally superior.

Typical fields of application are:

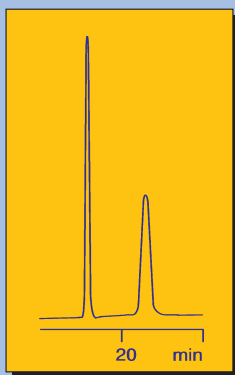
- purity check of chiral samples (pharmaceuticals, agrochemicals, flavorings)
- chiral drug monitoring of biological materials: plasma, urine, tissues, etc.
- LC-MS coupling



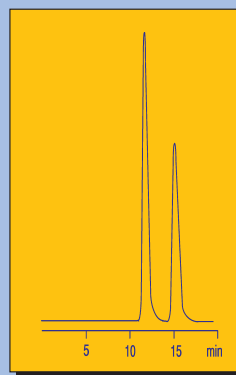
Verapamil  
CHIRA-GROM-1, 8  $\mu$ m,  
250 x 2 mm



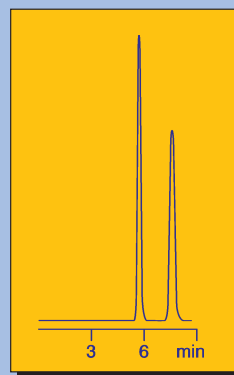
Bupivacain  
CHIRA-GROM-2, 8  $\mu$ m,  
250 x 2 mm



Mephobarbital  
CHIRA-GROM-3, 8  $\mu$ m,  
250 x 2 mm



Ofloxacin methyl ester  
CHIRA-GROM-4, 8  $\mu$ m,  
250 x 2 mm



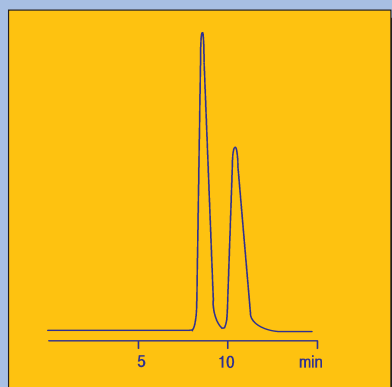
Warfarin  
CHIRA-GROM-9, 8  $\mu$ m,  
250 x 2 mm

\* For further technical information, see GROM-HPLC catalogue.

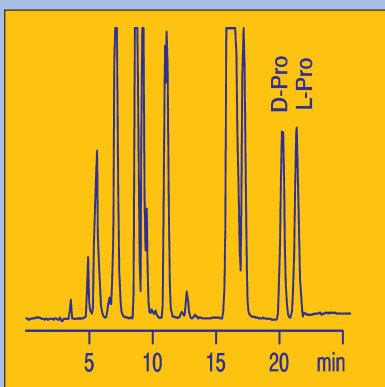
# cules by High Performance Liquid Chromatography

## III. Separation and analysis of chiral molecules by highly sensitive precolumn derivatisation

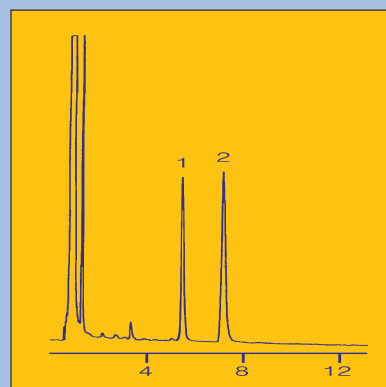
In liquid chromatography, chiral molecules can be analysed by applying three different techniques: eluting analytes by chiral mobile phases, packing columns with chiral stationary phases (see above) or even by reacting the enantiomers of interest with a chiral chromophoric or preferably fluorogenic agent, i.e., by precolumn derivatisation. Besides its simplicity, the major advantage of analysing enantiomers by precolumn derivatisation with a fluorogen is the high sensitivity inherent to fluorescence detection [J.Maier-Rosenkranz, A. Maisch, A.Kupka and P.Földi, LC+GC International 7, 509-516 (1994), or H. Brückner, T. Westhauser, Chromatographia 39, 419-426 (1994)]. The detection limit routinely obtained with this method is in the lower fmol range.



Penicillamine  
GROM-SIL 120 ODS-3 CP, 5  $\mu\text{m}$ ,  
250 x 3 mm

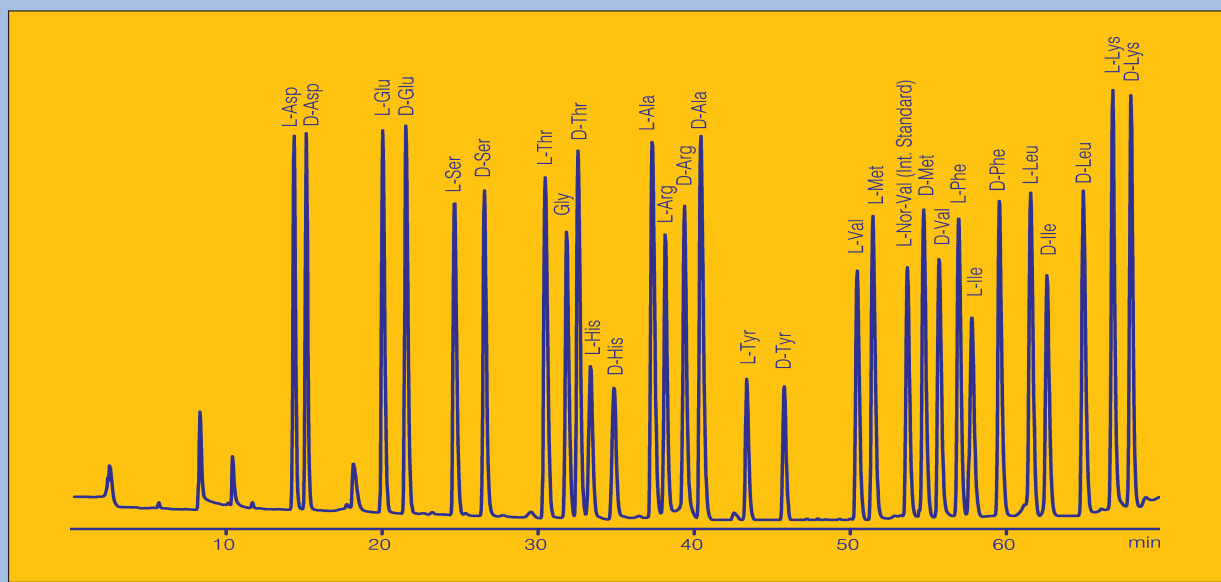


D/L-Proline  
GROM-SIL FLEC-1, 3  $\mu\text{m}$ ,  
250 x 4 mm



Propanolol  
GROM-SIL 100 ODS-2 FE, 5  $\mu\text{m}$ ,  
125 x 4 mm

For the simple analysis of chiral alcohols and amines such as D/L-dopa, D/L-penicillamine, D/L-amino acids,  $\beta$ -blockers (metopropolol, propanolol), etc., by this technique, GROM offers dedicated Derivatisation Kits. These consist of tailor made, customised columns, and the chemicals required for the formation of either the (+)-1-(9-fluorenyl)-ethyl-chloroformate / 1-amino-adamantane (FLEC/ADAM) or ortho-phthalaldehyde/iso-butyl-L-cysteine (OPA/ IBLC) derivatives. In addition, they include a detailed description of the derivatisation procedure and the chromatography conditions, as well as literature references.



Separation of D/L-amino acids derivatised with OPA/IBLC (column. GROM-SIL =OPA-2, 5  $\mu\text{m}$ , 250 x 4 mm)

\* For further informations concerning amino acid analysis see pages 53 to 67

No.	COMPOUND	FORMULA	COLUMN	ELUENT	DETECTION
1	Abscisic acid	C15 H20 O4	2	Hexane:2-PrOH:TFA 80:20:1	UV 240 nm
2	2c,4t-Abscisic acid methyl ester	C16 H22 O4	2	Hexane:2-PrOH 90:10	UV 240 nm
3	Acebutolol	C18 H28 N2 O4	2	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
4	Acebutolol-Hydrochlorid	C18 H28 N2 O4	2	Hexane:EtOH:DEA 90:10:0.4	UV 265 nm
5	1-Acenaphthenol	C12 H10 O	2	Hexane:2-PrOH 90:10	UV 254 nm
6	1-Acenaphthenol	C12 H10 O	3	Hexane:2-PrOH 90:10	UV 254 nm
7	Acephate	C4 H10 N O3 P S	9	Hexane:2-PrOH 80:20	UV 235 nm
8	Acetamidomalonate deriv.	C22 H23 N O5	3	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
9	3-Acetoxy-2-carbomethoxy-cyclohexene	C11 H16 O4	2	Hexane:2-PrOH 99:1	UV 214 nm
10	3-Acetoxy-2-carbomethoxy-cyclopentene	C10 H14 O4	2	Hexane:2-PrOH 90:10	UV 214 nm
11	4-Acetoxy-2-azetidinone	C5 H7 N O3	9	Hexane:2-PrOH 80:20	UV 214 nm
12	4-Acetoxy-2-azetidinone	C5 H7 N O3	4	Hexane:EtOH 80:20	UV 214 nm
13	4-Acetoxy-2-azetidinone	C5 H7 N O3	4	Hexane:EtOH 80:20	UV 214 nm
14	4-Acetoxy-3,3-dimethyl-2-azetidinone	C7 H11 N O3	9	Hexane:2-PrOH 90:10	UV 214 nm
15	4-Acetoxy-3-ethyl-2-azetidinone	C7 H11 N O3	4	Hexane:EtOH 80:20	UV 214 nm
16	4-Acetoxy-3-ethyl-2-azetidinone	C7 H11 N O3	4	Hexane:EtOH 80:20	UV 214 nm
17	4-Acetoxy-5-(4'-methoxyphenoxy)-1-pentyne	C14 H16 O4	2	Hexane:2-PrOH 99:1	UV 254 nm
18	N-Acetyl-alanine benzyl ester	C12 H15 N O3	9	Hexane:2-PrOH 80:20	UV 254 nm
19	N-Acetyl-alanine benzyl ester	C12 H15 N O3	1	Hexane:2-PrOH 90:10	UV 254 nm
20	N-Acetyl-alanine benzyl ester	C12 H15 N O3	2	Hexane:2-PrOH 90:10	UV 254 nm
21	N-Acetyl-alanine ethyl ester	C7 H13 N O3	1	Hexane:2-PrOH 90:10	UV 214 nm
22	N-Acetyl-alanine ethyl ester	C7 H13 N O3	2	Hexane:2-PrOH 90:10	UV 214 nm
23	N-Acetyl-alanine ethyl ester	C7 H13 N O3	9	Hexane:2-PrOH 80:20	UV 214 nm
24	N-Acetyl-aminoglutethimide	C15 H18 N2 O3	3	Hexane:2-PrOH 50:50	UV 254 nm
25	N-Acetyl-aminoglutethimide	C15 H18 N2 O3	2	Hexane:2-PrOH 70:30	UV 254 nm
26	N-Acetyl-cyclohexylaminoglutethimide	C19 H24 N2 O3	2	Hexane:2-PrOH 50:50	UV 254 nm
27	N-Acetyl-indoline-2-carboxylic acid	C11 H11 N O3	2	Hexane:2-PrOH:HCOOH 80:20:1	UV 254 nm
28	N-Acetyl-indoline-2-carboxylic acid	C11 H11 N O3	1	Hexane:2-PrOH:HCOOH 80:20:1	UV 254 nm
29	Acetylacetonate(tris-)-cobalt (III)	C15 H21 Co O6	2	(SFC) CO2:2-PrOH 96:4	UV 254 nm
30	Afloqualone	C16 H14 F N3 O	4	Hexane:EtOH 95:5	UV 254 nm
31	Alanine benzyl ester	C10 H13 N O2	2	Hexane:2-PrOH 90:10	UV 254 nm
32	Alprenolol	C15 H23 N O2	2	Hexane:2-PrOH:DEA 90:10:0.01	UV 254 nm
33	Alprenolol	C15 H23 N O2	2	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
34	Alprenolol hydrochloride	C15 H23 N O2	2	Hexane:2-PrOH:DEA 20:80:0.4	UV 273 nm
35	1-(2-Amino-3-nitrophenoxy)-2',3'-epoxypropane	C9 H10 N2 O4	2	Hexane:2-PrOH 80:20	UV 254 nm
36	1-(B1992-Amino-3-nitrophenoxy)-3'-(N-t-butylamino)propan-2'-ol	C13 H21 N3 O4	2	Hexane:2-PrOH 80:20	UV 254 nm
37	2-Amino-5-hydroxy-tetralin (salt)	C10 H13 N O	2	Hexane:EtOH 95:5	UV 225 nm
38	2-Amino-5-hydroxy-tetralin deriv. (salt)	C19 H25 N O S	2	Hexane:EtOH 95:5	UV 225 nm
39	2-Amino-5-hydroxy-tetralin deriv. (salt)	C21 H27 N O	2	Hexane:EtOH 95:5	UV 225 nm
40	2-Amino-5-hydroxy-tetralin deriv. (salt)	C16 H21 N O	2	Hexane:EtOH 95:5	UV 225 nm
41	2-Amino-5-hydroxy-tetralin deriv. (salt)	C21 H26 Cl N O	2	Hexane:EtOH 95:5	UV 225 nm
42	2-Amino-5-methoxy-tetralin (salt)	C11 H15 N O	2	Hexane:EtOH 90:10	UV 225 nm
43	2-Amino-7-hydroxy-tetralin deriv. (salt)	C19 H25 N O S	2	Hexane:EtOH 95:5	UV 225 nm
44	2-Amino-8-hydroxy-tetralin deriv. (salt)	C14 H17 N O	2	Hexane:EtOH 95:5	UV 225 nm
45	4-Amino-[2.2]-paracyclophane	C16 H17 N	2	Hexane:2-PrOH 90:10	UV 254 nm
46	Aminoglutethimide	C13 H16 N2 O2	3	Hexane:2-PrOH 50:50	UV 254 nm
47	Aminoglutethimide	C13 H16 N2 O2	2	Hexane:2-PrOH 60:40	UV 254 nm
48	Arene chromium carbonyl complexe deriv.	C9 H9 Cl. Cr(CO)3	2	Hexane:2-PrOH 90:10	UV 254 nm
49	Arene chromium carbonyl complexe deriv.	C8 H7 Cl. Cr(CO)3	2	Hexane:2-PrOH 90:10	UV 254 nm
50	Arene chromium carbonyl complexe deriv.	C12 H15 Cl. Cr(CO)3	2	Hexaen:2-PrOH 90:10	UV 254 nm
51	1-Arylmethyl-tetrahydroisoquinoline deriv.	C21 H23 N O5	3	Hexane:EtOH 10:90	UV 254 nm
52	2-Aryloxy-propionic acid deriv.	C17 H16 O4	2	Hexane:2-PrOH:HCOOH 94.5:5:0.5	UV 260 nm
53	2-Aryloxy-propionic acid deriv.	C11 H14 O3	2	Hexane:2-PrOH:HCOOH 95:4.5:0.5	UV 260 nm
54	2-Aryloxy-propionic acid deriv.	C16 H14 O4	2	Hexane:2-PrOH:HCOOH 94.5:5:0.5	UV 260 nm
55	2-Aryloxy-propionic acid deriv.	C16 H14 O4	2	Hexane:2-PrOH:HCOOH 94.5:5:0.5	UV 260 nm
56	2-Aryloxy-propionic acid deriv.	C16 H16 O3	2	Hexane:2-PrOH:HCOOH 94.5:5:0.5	UV 260 nm
57	2-Aryloxy-propionic acid deriv.	C17 H18 O4	2	Hexane:2-PrOH 90:10	UV 260 nm
58	2-Aryloxy-propionic acid deriv.	C16 H16 O4	2	Hexane:2-PrOH:HCOOH 94.5:5:0.5	UV 260 nm
59	2-Aryloxy-propionic acid deriv.	C15 H14 O4	2	Hexane:2-PrOH:HCOOH 94.5:1	UV 260 nm
60	Arylthiophosphate	C14 H13 Cl2 O2 P S	3	Hexane:2-PrOH 90:10	UV 254 nm
61	Arylthiophosphate (EPN)	C14 H14 N O4 P S	3	Hexane:2-PrOH 90:10	UV 254 nm
62	Arylthiophosphate (Surecide)	C15 H14 N O2 P S	3	Hexane:2-PrOH 90:10	UV 254 nm
63	Atenolol	C14 H22 N2 O3	2	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm

No.	COMPOUND	FORMULA	COLUMN	ELUENT	DETECTION
64	Atropine	C17 H23 N O3	2	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
65	2-Azetidinone deriv.	C14 H13 N3 O4	4	Hexane:EtOH 80:20	UV 254 nm
66	1-Azido-2-phenyl-2,3-propanediol dibenzoate	C23 H19 N3 O4	2	Hexane:2-PrOH 95:5	UV 254 nm
67	N-BOC-alanine benzyl ester	C15 H21 N O4	1	Hexane:2-PrOH 90:10	UV 254 nm
68	Benzoin	C14 H12 O2	3	Hexane:2-PrOH 90:10	UV 254 nm
69	Benzoin	C14 H12 O2	2	Hexane:2-PrOH 90:10	UV 254 nm
70	Benzoin	C14 H12 O2	1	Hexane:2-PrOH 90:10	UV 254 nm
71	Benzoin	C14 H12 O2	4	Hexane:2-PrOH 90:10	UV 254 nm
72	N-Benzoyl-alanine benzyl ester	C17 H17 N O3	2	Hexane:2-PrOH 90:10	UV 254 nm
73	N-Benzoyl-alanine benzyl ester	C17 H17 N O3	1	Hexane:2-PrOH 90:10	UV 254 nm
74	N-Benzoyl-alanine ethyl ester	C12 H15 N O3	2	Hexane:2-PrOH 90:10	UV 254 nm
75	N-Benzoyl-alanine ethyl ester	C12 H15 N O3	1	Hexane:2-PrOH 90:10	UV 254 nm
76	N-Benzoyl-beta-pyrenyl alanine ethyl ester	C28 H23 N O3	2	Hexane:2-PrOH 90:10	UV 254 nm
77	N-Benzoyl-methamphetamine	C17 H19 N O	3	Hexane:2-PrOH 90:10	UV 220 nm
78	4-Benzoylmethyl-2-azetidinone	C11 H11 N O2	1	Hexane:2-PrOH 80:20	UV 254 nm
79	4-Benzoylmethyl-2-azetidinone	C11 H11 N O2	2	Hexane:2-PrOH 80:20	UV 254 nm
80	4-Benzoylmethylene-2-azetidinone	C11 H11 N O2	4	Hexane:EtOH 80:20	UV 254 nm
81	4-Benzoyloxy-2-azetidinone	C10 H9 N O3	2	Hexane:2-PrOH 90:10	UV 254 nm
82	4-Benzoyloxy-2-azetidinone	C10 H9 N O3	4	Hexane:EtOH 80:20	UV 254 nm
83	1-O-Benzyl-3-O-octadecyl-glycerol	C28 H50 O3	2	Hexane:2-PrOH 99.4:0.6	UV 254 nm
84	O-Benzyl-glycidol	C10 H12 O2	2	Hexane:2-PrOH 100:5	UV 254 nm
85	Benzyl-tetradydrojatrorrhizine	C27 H29 N O4	9	EtOH	UV 254 nm
86	2-(4-Benzoyloxy-3-methoxybenzyl)-4-methyl-pentan-1,4-diol	C21 H28 O4	2	Hexane:2-PrOH 90:10	UV 254 nm
87	4-Benzoyloxy-3-methoxybenzyl succinic acid dimethyl ester	C21 H24 O6	2	Hexane:2-PrOH 90:10	UV 254 nm
88	alpha-Benzoyloxy-acryliron (II) complex	C29 H25 FeO3P.C5H5	2	Hexane:2-PrOH 98.5:1.5	UV 277 nm
89	(5,10-trans-bis(2-Benzoyloxynaphthyl) octaethylporphyrin Zn compl.	C70 H68 N4 O2 Zn	2	Hexane:2-PrOH:CHCl3 95:0.5:0.5	UV 254 nm
90	Benzylvinyl-tolyl-sulfoxide	C16 H16 O S	9	Hexane:2-PrOH 90:10	UV 254 nm
91	Betaxolol hydrochlorid	C18 H29 N O3	2	Hexane:BuOH 85:15	UV 254 nm
92	Betaxolol hydrochlorid	C18 H29 N O3	2	Hexane:2-PrOH 92:8	UV 254 nm
93	Betaxolol hydrochlorid	C18 H29 N O3	2	Hexane:2-PrOH 83:17	UV 254 nm
94	Betaxolol hydrochlorid	C18 H29 N O3	2	Hexane:EtOH 98:2	UV 254 nm
95	Betaxolol hydrochlorid	C18 H29 N O3	2	Hexane:2-PrOH:DEA 92:8:0.5	UV 254 nm
96	Betaxolol hydrochlorid	C18 H29 N O3	2	Hexane:2-PrOH 85:15	UV 254 nm
97	Bisoprolol-hemifumarate	C18 H31 N O4	2	Hexane:2-PrOH:DEA 15:85:0.4	UV 273 nm
98	N-Boc-Rolipram	C21 H29 N O5	2	Hexane:2-PrOH 90:10	UV 254 nm
99	N-Boc-alanine benzyl ester	C15 H21 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
100	4-Bromo-[2,2]-paracyclophane	C16 H15 Br	1	Hexane	UV 254 nm
101	alpha-Bromo-isovalerylurea	C6 H11 Br N2 O2	3	Hexane:2-PrOH 90:10	UV 210 nm
102	alpha-Bromo-isovalerylurea	C6 H11 Br N2 O2	2	Hexane:2-PrOH 90:10	UV 210 nm
103	alpha-Bromo-valerylurea	C6 H11 Br N2 O2	3	Hexane:2-PrOH 90:10	UV 210 nm
104	N-2-Butyl-benzamide	C11 H15 N O	2	Hexane:2-PrOH 90:10	UV 254 nm
105	s-Butyl-2,6-dimethyl-phenylcarbamate	C13 H19 N O2	9	Hexane:2-PrOH 98:2	UV 254 nm
106	s-Butyl-2-methyl-phenylcarbamate	C12 H17 N O2	2	Hexane:2-PrOH 90:10	UV 254 nm
107	s-Butyl-2-methyl-phenylcarbamate	C12 H17 N O2	9	Hexane:2-PrOH 98:2	UV 254 nm
108	s-Butyl-3,4-dimethyl-phenylcarbamate	C13 H19 N O2	9	Hexane:2-PrOH 98:2	UV 254 nm
109	s-Butyl-3,4-dimethyl-phenylcarbamate	C13 H19 N O2	2	Hexane:2-PrOH 90:10	UV 254 nm
110	s-Butyl-3,5-dimethyl-phenylcarbamate	C13 H19 N O2	9	Hexane:2-PrOH 98:2	UV 254 nm
111	s-Butyl-3,5-dimethyl-phenylcarbamate	C13 H19 N O2	2	Hexane:2-PrOH 90:10	UV 254 nm
112	s-Butyl-3-methyl-phenylcarbamate	C12 H17 N O2	2	Hexane:2-PrOH 98:2	UV 254 nm
113	s-Butyl-4-bromo-phenylcarbamate	C11 H14 Br N O2	2	Hexane:2-PrOH 98:2	UV 254 nm
114	s-Butyl-4-chloro-phenylcarbamate	C11 H14 Cl N O2	2	Hexane:2-PrOH 90:10	UV 254 nm
115	s-Butyl-4-fluoro-phenylcarbamate	C11 H14 F N O2	9	Hexane:2-PrOH 98:2	UV 254 nm
116	s-Butyl-4-fluoro-phenylcarbamate	C11 H14 F N O2	2	Hexane:2-PrOH 90:10	UV 254 nm
117	s-Butyl-4-methyl-phenylcarbamate	C12 H17 N O2	2	Hexane:2-PrOH 90:10	UV 254 nm
118	s-Butyl-4-methyl-phenylcarbamate	C12 H17 N O2	9	Hexane:2-PrOH 98:2	UV 254 nm
119	s-Butyl-phenylcarbamate	C11 H15 N O2	9	Hexane:2-PrOH 98:2	UV 254 nm
120	s-Butyl-phenylcarbamate	C11 H15 N O2	2	Hexane:2-PrOH 90:10	UV 254 nm
121	s-Butyl-phenylcarbamate	C11 H15 N O2	9	Hexane:2-PrOH 90:10	UV 254 nm
122	tert-Butyl-dimethylsilyloxy-rhododendrol	C16 H28 O2 Si	3	Hexane:2-PrOH 99.75:0.25	UV 254 nm
123	tert-Butyl-oxycarbonyl(N)-4-phenyl-pyrrolidinone	C15 H19 N O3	3	Hexane:2-PrOH 95:5	UV 254 nm
124	Calix[4]arene deriv.	C63 H72 N2 O4	2	Hexane:2-PrOH 95:5	UV 230 nm
125	Canadine	C20 H21 N O4	9	EtOH	UV 254 nm
126	Capaurine	C21 H25 N O5	9	EtOH	UV 254 nm

No.	COMPOUND	FORMULA	COLUMN	ELUENT	DETECTION
127	Carazolol	C18 H22 N2 O2	2	Hexane:2-PrOH:DEA 70:30:1	UV 240 nm
128	4-Carboxy-2-cyclopenten-1-ol	C8 H12 O3	2	Hexane:2-PrOH 90:10	UV 214 nm
129	Carbinoxamine	C16 H19 Cl N2 O	2	Hexane:2-PrOH 90:10	UV 254 nm
130	Carbinoxamine	C16 H19 Cl N2 O	1	Hexane:2-PrOH 90:10	UV 254 nm
131	4-Carboxy-[2.2]paracyclophane	C17 H16 O2	2	Hexane:2-PrOH:TFA 90:10:1	UV 254 nm
132	Carteolol	C16 H24 N2 O3	2	Hexane:2-PrOH 90:10	UV 254 nm
133	Celiprolol	C20 H33 N3 O4	2	Hexane:2-PrOH:DEA 85:20:0.1	FI 295/345
134	Chlormezanone	C11 H12 Cl N O3 S	3	EtOH:H2O 96:4	UV 254 nm
135	2-(2-Chloro-phenoxy)-2-propionic acid	C9 H9 Cl O3	2	Hexane:2-PrOH:HCOOH 90:10:1	UV 254 nm
136	2-Chloro-phenoxy-2-propanoic acid methyl ester	C10 H11 Cl O3	2	Hexane:2-PrOH:HCOOH 94.5:5:0.5	UV 260 nm
137	4-Chloro-[2.2]-paracyclophane	C16 H15 Cl	1	Hexane	UV 254 nm
138	8-Chloro-3-methyl-4-chromanone	C10 H9 Cl O2	3	Hexane:2-PrOH 99:1	UV 240 nm
139	Cicprololol	C18 H29 N O4	2	Hexane:2-PrOH:EtOH 80:5:15	UV 273 nm
140	(E)-1-Cinnamyl-1,3-propandiol	C11 H14 O2	2	Hexane:2-PrOH 95:5	UV 254 nm
141	(E)-1-Cinnamyl-2,2-dimethyl-1,3-propandiol	C13 H18 O2	2	Hexane:2-PrOH 95:5	UV 254 nm
142	Citalopram	C20 H21 F N2 O	2	Hexane:2-PrOH 94:6	FI 240/296
143	Clenbuterol	C12 H18 Cl2 N2 O	3	Hexane:EtOH 95:5	UV 254 nm
144	Clofedanol	C17 H20 Cl N O	3	Hexane:2-PrOH 90:10	UV 254 nm
145	Cloperastine	C20 H24 Cl N O	2	Hexane:2-PrOH 100:0.5	UV 229 nm
146	Cloxazolam	C17 H14 Cl2 N2 O2	3	EtOH	UV 254 nm
147	Cloxazolam	C17 H14 Cl2 N2 O2	4	Hexane:EtOH 90:10	UV 254 nm
148	trans-1,2-Cyclobutane-dicarboxylic acid	C6 H8 O4	1	Hexane:2-PrOH:HCOOH 90:10:1	UV 214 nm
149	Cyclohexylaminogluthethimide	C17 H22 N2 O2	2	Hexane:2-PrOH 50:50	UV 257 nm
150	Cyclopentenone prostaglandin precursor	C22 H38 O4 Si	9	Hexane:2-PrOH 99:1	UV 215 nm
151	Cyclopentenone prostaglandin precursor	C19 H32 O4 Si	9	Hexane:2-PrOH 99:1	UV 215 nm
152	Cyclopentenone prostaglandin precursor	C19 H32 O4 Si	9	Hexane:t-BuOH 99:1	UV 215 nm
153	Cyclopentenone prostaglandin precursor	C19 H32 O4 Si	9	Hexane:n-BuOH 99:1	UV 215 nm
154	Cyclopentenone prostaglandin precursor	C19 H32 O4 Si	9	Hexane:1-PrOH 99.35:0.65	UV 215 nm
155	Cyclopentenone prostaglandin precursor	C19 H32 O4 Si	9	Hexane:EtOH 99.6:0.4	UV 215 nm
156	Cyclopentenone prostaglandin precursor	C19 H32 O4 Si	9	Hexane:2-PrOH 99:1	UV 215 nm
157	Cyclopentenone prostaglandin precursor	C26 H30 O4 Si	9	Hexane:2-PrOH 99:1	UV 215 nm
158	Cyclopentenone prostaglandin precursor	C13 H18 O4	9	Hexane:2-PrOH 85:15	UV 215 nm
159	Cyclopentenone prostaglandin precursor	C19 H32 O4 Si	2	Hexane:2-PrOH 99:1	UV 215 nm
160	Cyclopentenone prostaglandin precursor	C13 H20 N2 O2	3	Hexane:EtOH 60:40	UV 254 nm
161	Cyclopentolate	C17 H25 N O3	3	Hexane:2-PrOH 90:10	UV 254 nm
162	Cyclopentolate	C17 H25 N O3	2	Hexane:2-PrOH 90:10	UV 254 nm
163	trans-Cyclopropane-1,2-N-phenylcarboxamide	C17 H16 N2 O2	4	Hexane:2-PrOH 90:10	UV 254 nm
164	trans-Cyclopropane-dicarboxylic acid	C5 H6 O4	2	Hexane:2-PrOH:HCOOH 95:5:1	UV 214 nm
165	trans-Cyclopropane-dicarboxylphenylamide	C17 H16 N2 O2	2	Hexane:2-PrOH 90:10	UV 254 nm
166	trans-Cyclopropane-dicarboxylphenylamide	C17 H16 N2 O2	1	Hexane:2-PrOH 90:10	UV 254 nm
167	Cyclopyrrolone deriv.	C23 H21 Cl N4 O4	9	Hexane:EtOH 10:90	UV 342 nm
168	Cyclopyrrolone deriv.	C23 H22 Cl N3 O2	9	Hexane:EtOH 10:90	UV 342 nm
169	Cyclopyrrolone deriv.	C22 H19 Cl N4 O4	9	Hexane:EtOH 10:90	UV 342 nm
170	N-Dimethyl-dimethindene	C19 H22 N2	2	Hexane:EtOH:DEA 90:10:0.1	UV 259 nm
171	Deprenyl (selegiline)	C13 H17 N	2	Hexane:2-PrOH 100:1	UV 210 nm
172	N-Desalkyl-propafenone	C18 H21 N O3	2	Hexane:2-BuOH:DEA 85:15:0.1	UV 254 nm
173	N,N'-Di-z-lysine benzyl ester	C29 H32 N2 O6	1	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
174	4-(3-Diazo-3-benzyloxycarbonyl-2-oxopropyl)-2-azetidinone	C14 H13 N3 O4	1	Hexane:2-PrOH 80:20	UV 254 nm
175	4-(3-Diazo-3-benzyloxycarbonyl-2-oxopropyl)-2-azetidinone	C14 H13 N3 O4	2	Hexane:2-PrOH 80:20	UV 254 nm
176	4-(3-Diazo-3-ethoxycarbonyl-2-oxopropyl)-2-azetidinone	C9 H11 N3 O4	1	Hexane:2-PrOH 80:20	UV 220 nm
177	4-(3-Diazo-3-ethoxycarbonyl-2-oxopropyl)-2-azetidinone	C9 H11 N3 O4	2	Hexane:2-PrOH 80:20	UV 220 nm
178	4-(3-Diazo-3-methoxycarbonyl-2-oxopropyl)-2-azetidinone	C8 H9 N3 O4	2	Hexane:2-PrOH 80:20	UV 220 nm
179	4-(3-Diazo-3-methoxycarbonyl-2-oxopropyl)-2-azetidinone	C8 H9 N3 O4	1	Hexane:2-PrOH 80:20	UV 220 nm
180	4-(3-Diazo-3-tert-butoxycarbonyl-2-oxopropyl)-2-azetidinone	C11 H15 N3 O4	1	Hexane:2-PrOH 80:20	UV 220 nm
181	4-(3-Diazo-3-tert-butoxycarbonyl-2-oxopropyl)-2-azetidinone	C11 H15 N3 O4	9	Hexane:2-PrOH 80:20	UV 220 nm
182	4',6-Dichloro-flavan	C15 H12 Cl2 O	2	Hexane:2-PrOH 90:10	DAD 233-, 253-, 495 nm
183	4,16-Dicyano-[2.2]-paracyclophane	C18 H14 N2	2	Hexane:2-PrOH 90:10	UV 254 nm
184	4,16-Dicyano-[2.2]-paracyclophane	C18 H14 N2	1	Hexane:2-PrOH 90:10	UV 254 nm
185	trans-Diethyl-stilbestrol	C19 H22 O3	3	Hexane:2-PrOH 80:20	UV 254 nm
186	1,4-Dihydro-pyridine deriv.	C22 H24 N2 O8	1	Hexane:EtOH 96:4	UV 240 nm
187	1,4-Dihydro-pyridine deriv.	C22 H26 N2 O8	1	Hexane:EtOH 95:5	UV 240 nm
188	1,4-Dihydro-pyridine deriv.	C19 H20 N2 O8	1	Hexane:EtOH 95:5	UV 240 nm

No.	COMPOUND	FORMULA	COLUMN	ELUENT	DETECTION
189	1,4-Dihydro-pyridine deriv.	C21 H24 N2 O8	1	Hexane:EtOH 96:4	UV 240 nm
190	1,4-Dihydro-pyridine deriv.	C20 H22 N2 O8	1	Hexane:EtOH 95:5	UV 240 nm
191	2-(10,11-Dihydro-10-oxodibenzo[b,f]thiepin-2-yl)propanoic acid	C17 H14 O3 S	3	Hexane:2-PrOH:HAc 90:10:2	UV 254 nm
192	2-(10,11-Dihydro-10-oxodibenzo[b,f]thiepin-2-yl)propanoic acid	C17 H14 O3 S	3	Hexane:2-PrOH 90:10	UV 254 nm
193	2,3-Dihydro-2-phenyl-4H-pyran-4-one	C11 H10 O2	2	Hexane:2-PrOH 90:10	UV 254 nm
194	Dihydropyridine derivative	C22 H30 N2 O3	3	Hexane:2-PrOH 90:10	UV 254 nm
195	2,2'-Dihydroxy-6,6'-dimethyl-1,1'-diphenyl	C14 H14 O2	2	Hexane:2-PrOH 90:10	UV 254 nm
196	2,2'-Dihydroxy-6,6'-dimethyl-1,1'-diphenyl	C14 H14 O2	9	Hexane:2-PrOH 90:10	UV 254 nm
197	2,2'-Dihydroxy-6,6'-dimethyl-1,1'-diphenyl	C14 H14 O2	4	Hexane:2-PrOH 90:10	UV 254 nm
198	2,2'-Dihydroxy-6,6'-dimethyl-1,1'-diphenyl	C14 H14 O2	1	(SFC) CO <sub>2</sub> :2-PrOH 96:4	UV 254 nm
199	4,16-Dihydroxymethyl-[2.2]paracyclophane	C18 H20 O2	1	Hexane:2-PrOH 90:10	UV 254 nm
200	Diltiazem	C22 H26 N2 O4 S	9	EtOH:DEA 100:1	UV 240 nm
201	Diltiazem	C22 H26 N2 O4 S	2	Hexane:2-PrOH 90:10	UV 254 nm
202	Dimethindene	C20 H24 N2	2	Hexane:EtOH:DEA 90:10:0.1	UV 259 nm
203	Dimethindene-N-oxide	C20 H24 N2 O	2	Hexane:EtOH:DEA 90:10:0.1	UV 259 nm
204	Dimethothiazine	C19 H25 N3 O2 S2	1	Hexane:2-PrOH 90:10	UV 254 nm
205	3,4-Dimethoxybenzylsuccinic acid dimethyl ester	C15 H20 O6	2	Hexane:2-PrOH 90:10	UV 254 nm
206	2,2'-Dimethyl-6,6'-dihydroxy-biphenyl	C14 H14 O2	1	Hexane:2-PrOH 90:10	UV 254 nm
207	2,2-Dimethyl-1-phenyl-1-propanol	C11 H16 O	2	Hexane:2-PrOH 95:5	UV 254 nm
208	2,4-Dimethyl-delta-valerolacton	C7 H12 O2	1	Hexane:EtOH 95:5	UV 215 nm
209	3,3'-Dimethyl-1,1'-bi-2-naphthol	C22 H18 O2	2	Hexane:2-PrOH 98:2	UV 254 nm
210	3,6-Dimethyl-4-chromanone	C11 H12 O2	3	Hexane:2-PrOH 99:1	UV 240 nm
211	6,6'-Dimethyl-biphenyl-2,2'-dicarboxylic acid dimethyl ester	C18 H18 O4	9	Hexane:2-PrOH 90:10	UV 254 nm
212	1,1'-Dimethyl-binaphthalene-2,2'-dicarboxylate	C24 H18 O4	2	Hexane:2-PrOH 90:10	UV 254 nm
213	Dimethyl-2,3-diphenyltartrate	C18 H18 O6	2	Hexane:2-PrOH 90:10	UV 254 nm
214	1-(2,3-Dinitro-phenoxy)-2',3'-epoxypropane	C9 H8 N2 O6	2	Hexane:2-PrOH 75:25	UV 254 nm
215	1,2-Diphenyl-cyclopropane	C15 C14	3	Hexane:2-PrOH 90:10	UV 254 nm
216	1,2-Diphenyl-ethane-1,2-diol	C14 H14 O2	3	Hexane:2-PrOH 90:10	UV 254 nm
217	1,2-Diphenyl-ethanol	C14 H14 O	2	Hexane:2-PrOH 90:10	UV 254 nm
218	1,2-Diphenyl-ethylamine	C14 H15 N	2	Hexane:2-PrOH 90:10	UV 254 nm
219	1,3-Diphenyl-pentan-1-one	C17 H18 O	2	Hexane:2-PrOH 99.75:0.25	UV 254 nm
220	Diphenyl(trans)-cyclopropane-carboxylic acid	C16 H14 O2	2	Hexane:2-PrOH:HCOOH 95:5:1	UV 254 nm
221	trans-2,3-Diphenyl-oxirane	C14 H12 O	9	Hexane:2-PrOH 90:10	UV 254 nm
222	trans-2,3-Diphenyl-oxirane	C14 H12 O	3	Hexane:2-PrOH 90:10	UV 254 nm
223	trans-2,3-Diphenyl-oxirane	C14 H12 O	2	Hexane:2-PrOH 90:10	UV 254 nm
224	trans-2,3-Diphenyl-oxirane	C14 H12 O	4	Hexane:2-PrOH 90:10	UV 254 nm
225	trans-2,3-Diphenyl-oxirane	C14 H12 O	1	Hexane:2-PrOH 90:10	UV 254 nm
226	Diprafenone	C23 H31 N O3	2	Hexane:2-PrOH 90:10	UV 254 nm
227	Epoxy-alcohol deriv.	C17 H22 O3	2	Hexane:2-PrOH 90:10	UV 254 nm
228	3-(1,2-Epoxyethyl)-1,5-dihydro-3H-2,4-benzodiazepine	C11 H12 O3	3	Hexane:2-PrOH 80:20	UV 254 nm
229	Esermethole	C14 H20 N2 O	3	Hexane:2-PrOH 95:5	
230	Ethiazide	C9 H12 Cl N3 O4 S2	4	Hexane:EtOH 80:20	UV 254 nm
231	Ethotoin	C11 H12 N2 O2	3	Hexane:2-PrOH 90:10	UV 254 nm
232	4-Ethoxycarbonyl-[2.2]paracyclophane	C19 H20 O2	2	Hexane:2-PrOH 90:10	UV 254 nm
233	Ethyl 2-acetamido-2-methyl-3-phenylpropionate	C14 H19 N O3	2	Hexane:2-PrOH 90:10	UV 254 nm
234	Ethyl 2-hydroxy-2-methyl-3(3-methoxy-4-hydroxyphenyl)propionate	C13 H18 O5	2	Hexane:2-PrOH 80:20	UV 254 nm
235	Ethyl 3-ethoxy-3-phenyl-propionate	C13 H18 O3	2	Hexane:2-PrOH 90:10	UV 250 nm
236	1-Ethyl-phenylacetic acid	C10 H12 O2	2	Hexane:2-PrOH:HCOOH 98:2:1	UV 254 nm
237	2-(3-Ethyl-phenyloxy)propanoic acid	C11 H14 O3	2	Hexane:2-PrOH:HCOOH 90:10:1	UV 260 nm
238	2-(o-Ethyl-phenoxy)-propanoic acid	C11 H14 O3	2	Hexane:2-PrOH:HCOOH 90:10:1	UV 260 nm
239	2-(o-Ethylphenoxy)-propanoic acid ethyl ester	C13 H18 O3	2	Hexane:2-PrOH 90:10	UV 260 nm
240	Ethylbenzoin	C16 H16 O2	4	Hexane:2-PrOH 90:10	UV 254 nm
241	Ethylsuccinic dianilide	C18 H20 N2 O2	2	Hexane:2-PrOH 90:10	UV 254 nm
242	Etodolac	C17 H21 N O3	2	Hexane:2-PrOH 90:10	UV 230 nm
243	Etodolac	C17 H21 N O3	2	Hexane:2-PrOH 90:10 (0.1% TFA)	UV 230 nm
244	Felodipine	C18 H19 Cl2 N O4	3	Hexane:2-PrOH 87.5:12.5	UV 240 nm
245	Fenoldopam	C16 H16 Cl N O3	3	Hexane:EtOH 80:20	UV 254 nm
246	Fenoprofen	C15 H14 O3	3	Hexane:2-PrOH:HAc 90:10:0.05	UV 254 nm
247	Ferrocenyl deriv.	C8 H9 O2.C5 H5.Fe	2	1.3 M 2-PrOH in Hexane	UV 220 nm
248	Flecainide	C17 H20 F6 N2 O3	2	Hexane:2-PrOH 92:8	UV 254 nm
249	4-Fluoro-[2.2]-paracyclophane	C16 H15 F	1	Hexane	UV 254 nm
250	6-Fluorobenzopyran-2-carboxylic acid ethyl ester	C12 H13 F O3	3	Hexane:2-PrOH 90:10	UV 254 nm

No.	COMPOUND	FORMULA	COLUMN	ELUENT	DETECTION
251	6-Fluorobenzopyran-2-carboxylic acid methyl ester	C11 H11 F O3	3	Hexane:2-PrOH 90:10	UV 254 nm
252	6-Fluorobenzopyran-2-carboxylic acid octyl ester	C18 H25 F O3	3	Hexane:2-PrOH 90:10	UV 254 nm
253	Flurbiprofen	C15 H13 F O2	1	Hexane:2-PrOH:TFA 95:5:1	UV 254 nm
254	Flurbiprofen methyl ester	C16 H15 F O2	3	Hexane:2-PrOH 90:10	UV 254 nm
255	Flurbiprofen-1-naphthalene-methylamide	C26 H22 F N O	9	Hexane:Dioxane 90:10	UV 254 nm
256	Flurbiprofen-1-naphthalene-methylamide	C26 H22 F N O	9	Hexane:MeOH 95:5	UV 254 nm
257	Flurbiprofen-1-naphthalene-methylamide	C26 H22 F N O	9	Hexane:MeOH 97:3	UV 254 nm
258	Flurbiprofen-phenethylamide	C23 H22 F N O	9	Hexane:MeOH 97:3	UV 254 nm
259	Flutazolam	C19 H19 F N2 O3	1	Hexane:2-PrOH 90:10	UV 254 nm
260	Folinic acid (Leucovorin)	C20 H23 N7 O7	9	MeOH	UV 287 nm
261	Furoin	C10 H8 O4	2	Hexane:2-PrOH 90:10	UV 254 nm
262	Glutethimide	C13 H15 N O2	3	Hexane:EtOH 60:40	UV 254 nm
263	Glutethimide	C13 H15 N O2	3	EtOH:H2O 96:4	UV 254 nm
264	Glutethimide	C13 H15 N O2	3	Hexane:2-PrOH 60:40	UV 254 nm
265	Glycidol-benzoate	C10 H10 O3	2	Hexane:2-PrOH 98:2	UV 254 nm
266	Glycidyl tosylate	C10 H12 O4 S	2	Hexane:2-PrOH 99:1	UV 230 nm
267	Goniothalamine	C13 H12 O2	3	Hexane:2-PrOH 90:10	UV 254 nm
268	Guaifenesin (Guaiaicol glyceryl ether)	C10 H14 O4	2	Hexane:2-PrOH:DEA 80:20:0.1	UV 275 nm
269	Guaifenesin (Guaiaicol glyceryl ether)	C10 H14 O4	2	ACN:H2O(0.4 M NaClO4) 20:80	UV 275 nm
270	Guaifenesin (Guaiaicol glyceryl ether)	C10 H14 O4	2	Hex.:abs.EtOH 50:50(0.5%DEA)	UV 275 nm
271	1,2,3,4,5,6-Hexachloro-cyclohexane	C6 H6 Cl6	9	Hexane:2-PrOH 90:10	
272	Hexobarbital	C12 H16 N2 O3	3	Hexane:2-PrOH 90:10	UV 230 nm
273	Homatropine	C16 H21 N O3	2	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
274	Homatropine	C16 H21 N O3	2	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
275	Homochlorcyclizine	C19 H23 Cl N2	2	0.2 M Isopropylamin in Hexane	UV 265 nm
276	1-Hydroxy-1-phenyl-3-heptanone	C13 H18 O2	1	Hexane:2-PrOH 95:5	UV 254 nm
277	1-Hydroxy-1-phenylethan	C8 H10 O	2	Hexane:2-PrOH 98:2	UV 254 nm
278	11-Hydroxy-5Z,8Z,12E,14Z-eicosatetraenoic acid	C20 H32 O3	9	Hexane:2-PrOH 99:1	UV 235 nm
279	11-Hydroxy-5Z,8Z,12E,14Z-eicosatetraenoic acid methyl ester	C21 H34 O3	2	Hexane:2-PrOH 99.5:0.5	UV 235 nm
280	12-Hydroxy-5Z,8Z,10E,14Z-eicosatetraenoic acid methyl ester	C21 H34 O3	9	Hexane:2-PrOH 99:1	UV 234 nm
281	12-Hydroxy-5Z,8Z,10E,14Z-eicosatetraenoic acid methyl ester	C21 H34 O3	2	Hexane:2-PrOH 98:2	UV 235 nm
282	12-Hydroxy-9Z,13E-octadecadienoic acid methyl ester	C19 H34 O3	2	Hexane:2-PrOH 99:1	UV 202 nm
283	13-Hydroxy-9Z,11E-octadecadienoic acid	C18 H32 O3	9	Hexane:2-PrOH 97:3	UV 235 nm
284	13-Hydroxy-9Z,11E-octadecadienoic acid	C18 H32 O3	2	Hexane:2-PrOH 97:3	UV 235 nm
285	13-Hydroxy-9Z,11E-octadecadienoic acid methyl ester	C19 H34 O3	2	Hexane:2-PrOH 99:1	UV 235 nm
286	13-Hydroxy-9Z,11E-octadecadienoic acid methyl ester	C19 H34 O3	9	Hexane:2-PrOH 99:1	UV 235 nm
287	13-Hydroxy-9Z,11E-octadecadienoic acid methyl ester	C19 H34 O3	2	Hexane:2-PrOH 98:2	UV 235 nm
288	15-Hydroxy-5Z,8Z,11Z,13E-eicosatetraenoic acid	C20 H32 O3	2	Hexane:2-PrOH 99.1	UV 235 nm
289	3-Hydroxy-halazepam	C17 H12 Cl F3 N2 O2	9	Hexane:CH2Cl2:2-PrOH 77:20:3	UV 254 nm
290	4-Hydroxy-2-cyclopentenone (silyliert)	C11 H20 O2 Si	9	Hexane:2-PrOH 98:2	UV 214 nm
291	4-Hydroxy-2-cyclopentenone (silyliert)	C11 H20 O2 Si	2	Hexane:2-PrOH 98:2	UV 214 nm
292	4-Hydroxy-2-cyclopentenone (trimethylsilyl-)	C8 H14 O2 Si	9	Hexane:2-PrOH 90:10	UV 214 nm
293	4-Hydroxy-2-cyclopentenone deriv.	C18 H18 O2 Si	9	Hexane:2-PrOH 90:10	UV 254 nm
294	4-Hydroxy-2-cyclopentenone deriv.	C13 H16 O2 Si	9	Hexane:2-PrOH 90:10	UV 254 nm
295	4-Hydroxy-5-(4'-methoxyphenoxy)-1-pentyne	C12 H14 O3	2	Hexane:2-PrOH 90:10	UV 254 nm
296	4-Hydroxy-glutethimide	C13 H15 N O3	3	Hexane:2-PrOH 25:75	UV 254 nm
297	4-Hydroxy-glutethimide	C13 H15 N O3	3	Hexane:EtOH 60:40	UV 254 nm
298	5-Hydroxy-6E,8Z,11Z,14Z-eicosatetraenoic acid methyl ester	C21 H34 O3	9	Hexane:2-PrOH 99.5:0.5	UV 235 nm
299	5-Hydroxy-diprafenone	C23 H31 N O4	2	Hexane:2-BuOH:HAc 80:20:0.85	UV 254 nm
300	5-Hydroxy-propafenone	C21 H27 N O4	2	Hexane:2-BuOH:HAc 80:20:0.85	UV 254 nm
301	8-Hydroxy-5Z,9E,11Z,14Z-eicosatetraenoic acid methyl ester	C21 H34 O3	2	Hexane:2-PrOH 98:2	UV 235 nm
302	9-Hydroxy-10E,12Z-octadecadienoic acid methyl ester	C19 H34 O3	2	Hexane:2-PrOH 98:2	UV 235 nm
303	9-Hydroxy-10E,12Z-octadecadienoic acid methyl ester	C19 H34 O3	9	Hexane:2-PrOH 99:1	UV 235 nm
304	2-(p-Hydroxy-phenoxy)-propionic acid	C10 H12 O4	3	Hexane:2-PrOH 90:10	UV 254 nm
305	Hydroxycyclopentenone deriv.	C13 H18 O4	9	Hexane:2-PrOH 85:15	UV 215 nm
306	4-Hydroxymethyl-[2.2]paracyclophane	C17 H18 O	2	Hexane:2-PrOH 90:10	UV 254 nm
307	5,10-trans-bis(2-Hydroxynaphthyl)-octaethylporphyrin zinc compl.	C56 H56 N4 O2 Zn	1	Hexane:2-PrOH 95:5	UV 254 nm
308	5-(p-Hydroxyphenyl)-5-phenylhydantoin	C15 H12 N2 O3	3	EtOH:H2O 70:30	UV 228 nm
309	Hydroxyzine	C21 H27 Cl N2 O2	2	ACN:H2O(0.1 M NaPF6) 40:60	UV 254 nm
310	Hydroxyzine	C21 H27 Cl N2 O2	2	Hexane:2-PrOH 90:10	UV 254 nm
311	Hydroxyzine	C21 H27 Cl N2 O2	3	Hexane:2-PrOH 90:10	UV 254 nm
312	Hydroxyzine	C21 H27 Cl N2 O2	1	Hexane:2-PrOH 90:10	UV 254 nm
313	Ibuprofenpinocol	C19 H23 N O2	2	Hexane:2-PrOH 90:10	UV 254 nm

No.	COMPOUND	FORMULA	COLUMN	ELUENT	DETECTION
314	Ibuprofenpinocol	C19 H23 N O2	1	Hexane:2-PrOH 90:10	UV 254 nm
315	Ifosfamide	C7 H15 Cl2 N2 O2 P	2	Hexane:2-PrOH 90:10	UV 220 nm
316	Indapamide	C16 H16 Cl N3 O3 S	3	ACN:H2O 40:60	UV 254 nm
317	Indapamide	C16 H16 Cl N3 O3 S	2	ACN:H2O 40:60	UV 254 nm
318	Indenestrol A	C18 H18 O2	3	Hexane:2-PrOH 80:20	UV 254 nm
319	Indenestrol B	C18 H18 O2	3	Hexane:2-PrOH 80:20	UV 254 nm
320	Iopanoic acid	C11 H12 I3 N O2	2	Hexane:EtOH:HAc 96.5:3:0.5	UV 254 nm
321	Isradipine	C19 H21 N3 O5	1	Hexane:2-PrOH:CHCl3 85:10:5	UV 254 nm
322	Isradipine	C19 H21 N3 O5	1	Hexane:2-PrOH 90:10	UV 254 nm
323	Isradipine	C19 H21 N3 O5	3	Hexane:2-PrOH 87.5:12.5	UV 240 nm
324	Ketoprofen	C16 H14 O3	1	Hexane:2-PrOH:TFA 80:20:1	UV 254 nm
325	Ketoprofen	C16 H14 O3	3	Hexane:2-PrOH:HAc 90:10:0.05	UV 254 nm
326	Laudanosine	C21 H27 N O4	2	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
327	Lorazepam	C15 H10 Cl2 N2 O2	9	Hexane:(CHCl2)2:2-PrOH 75:20:5	UV 230 nm
328	Lorazepam	C15 H10 Cl2 N2 O2	9	Hexane:(CHCl2)2:2-PrOH 72:20:8	UV 230 nm
329	Mandelic acid	C8 H8 O3	2	Hexane:2-PrOH:HCOOH 80:20:1	UV 254 nm
330	Mandelic acid	C8 H8 O3	2	Hexane:2-PrOH:TFA 80:20:1	UV 254 nm
331	Mandelic acid	C8 H8 O3	2	Hex.:2-PrOH:CHCl2COOH 80:20:1	UV 254 nm
332	Mandelic acid	C8 H8 O3	2	Hexane:2-PrOH:CCl3COOH 80:20:1	UV 254 nm
333	Mandelic acid methyl ester	C9 H10 O3	3	Hexane:2-PrOH 90:10	UV 254 nm
334	Manidipine	C35 H38 N4 O6	3	Hexane:EtOH:MeOH 80:15:5	UV 230 nm
335	Mephobarbital	C13 H14 N2 O3	3	EtOH:H2O 96:4	UV 254 nm
336	Mephobarbital	C13 H14 N2 O3	3	ACN:H2O 40:60	UV 254 nm
337	Methaqualone	C16 H14 N2 O	3	EtOH:H2O 96:4	UV 254 nm
338	Methaqualone	C16 H14 N2 O	3	ACN:H2O 40:60	UV 254 nm
339	Methocarbamol (Robaxin)	C11 H15 N O5	2	ACN:H2O(0.4 M NaClO4) 20:80	UV 275 nm
340	Methocarbamol (Robaxin)	C11 H15 N O5	2	Hex.:abs.EtOH 50:50(0.5%DEA)	UV 275 nm
341	1-Methoxy-phenylacetic acid	C9 H10 O3	2	Hexane:2-PrOH:HCOOH 90:10:1	UV 254 nm
342	2-Methoxy-2-phenylethyl 3-phenylpropionate	C18 H20 O3	2	Hexane:2-PrOH 97:3	UV 260 nm
343	4'-Methoxy-5-methoxy-6-methoxy-flavanone	C18 H18 O5	2		UV 254 nm
344	4'-Methoxy-flavanone	C16 H14 O3	2	Hexane:2-PrOH 90:10	UV 254 nm
345	1-(4-Methoxy-phenyl)-3-phenyl-pentan-1-one	C18 H20 O2	2	Hexane:2-PrOH 99.75:0.25	UV 254 nm
346	O-(4-Methoxy-phenyl)-glycerol	C10 H14 O4	2	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
347	O-(4-Methoxy-phenyl)-glycidylether	C10 H12 O3	2	Hexane:2-PrOH 91:9	UV 254 nm
348	sec-[4-(6-Methoxy-2-benzoxazolyl)]phenethyl alcohol	C16 H15 N O3	2	Hexane:2-PrOH 93:7	FI 315/375
349	2-(6-Methoxy-2-naphthalene)-propionitrile	C14 H13 N O	3	Hexane:2-PrOH 95:5	UV 254 nm
350	6-Methoxy-flavanone	C16 H14 O3	2	Hexane:2-PrOH 90:10	UV 254 nm
351	alpha-Methoxy-phenylacetic acid naphthalenemethylamide	C20 H19 N O2	9	Hexane:MeOH 97:3	UV 254 nm
352	alpha-Methoxy-phenylacetic acid naphthalenemethylamide	C20 H19 N O2	9	Hexane:MeOH 98:2	UV 254 nm
353	Methoxyphenamine	C11 H17 N O	2	Hexane:2-PrOH 90:10	UV 254 nm
354	Methoxyphenamine	C11 H17 N O	2	Hexane:2-PrOH 98:2	UV 254 nm
355	1-[b[3-(p-Methoxyphenyl-propyloxy)-p-methoxyphenethyl]-1H-imidazole	C22 H26 N2 O3	3	Hexane:EtOH 80:20	UV 254 nm
356	Methsuximide	C12 H13 N O2	3	EtOH:H2O 96:4	UV 254 nm
357	Methyl 2-(phenoxy)propionate	C10 H12 O3	2	Hexane:2-PrOH:HCOOH 90:10:1	UV 254 nm
358	Methyl 2-benzylsuccinoate	C13 H16 O4	9	Hexane:2-PrOH 75:25	UV 220 nm
359	Methyl 4-benzyloxy-3-hydroxybutanoate	C12 H16 O4	2	Hexane:2-PrOH 90:10	UV 254 nm
360	1-Methyl-phenylacetic acid	C9 H10 O2	2	Hexane:2-PrOH:HCOOH 98:2:1	UV 254 nm
361	13-Methyl-tetrahydroprotoberberine	C22 H27 N O4	9	EtOH	UV 254 nm
362	2-(3-Methyl-phenyloxy)propanoic acid ethyl ester	C12 H16 O3	2	Hexane:2-PrOH 90:10	UV 260 nm
363	2-(3-Methyl-phenyloxy)propionic acid	C10 H12 O3	2	Hexane:2-PrOH:HCOOH 95:4.5:0.5	UV 260 nm
364	2-(4-Methyl-phenyloxy)propanoic acid ethyl ester	C12 H16 O3	2	Hexane:2-PrOH 90:10	UV 260 nm
365	N-Methyl-3,4-diphenyl-tetrahydro-isoquinolin-4-ol	C22 H21 N O	3	Hexane:2-PrOH 93.75:6.25	UV 220 nm
366	N-Methyl-4-methoxy-3-allyl-3-methyl-oxindole	C14 H17 N O2	3	Hexane:2-PrOH 98:2	
367	N-Methyl-4-methoxy-3-pentenyl-3-methyl-oxindole	C16 H21 N O2	3	Hexane:2-PrOH 90:10	
368	N-Methyl-etioporphyrin	C33 H40 N4	2	Hexane:2-PrOH:DEA 95:5:0.1	UV 254 nm
369	N-Methyl-verapamil	C28 H41 N2 O4	2	ACN:H2O(0.5 M NaClO4) 40:60	UV 254 nm
370	alpha-Methyl-mandelic acid	C9 H10 O3	1	Hexane:2-PrOH:HCOOH 90:10:1	UV 254 nm
371	Methyl-7-[3-hydroxy-5-oxo-1-cyclopenten-1-yl]-4(Z)-heptenoate	C13 H18 O4	2	Hexane:2-PrOH 93:7	UV 214 nm
372	Methyl-alpha-amino-beta-hydroxy-4-nitrophenyl-propionate	C10 H12 N2 O5	3	Hexane:2-PrOH 70:30	UV 254 nm
373	Methyl-dihydrojasmonate	C13 H22 O3	4	Hexane:2-PrOH 98:2	UV 230 nm
374	Methyl-epijasmonate	C13 H20 O3	4	Hexane:2-PrOH 90:10	UV 230 nm
375	Methyl-jasmonate	C13 H20 O3	4	Hexane:2-PrOH 90:10	UV 230 nm

No.	COMPOUND	FORMULA	COLUMN	ELUENT	DETECTION
376	Methyl-phenyl sulfoxide	C7 H8 O S	2	Hexane:2-PrOH 90:10	UV 254 nm
377	(3,4-Methylene-dioxybenzyl)succinic acid dimethyl ester	C14 H16 O6	2	Hexane:2-PrOH 90:10	UV 254 nm
378	alpha-Methylene-gamma-butyrolactam deriv.	C19 H19 N O3	9	Hexane:EtOH 85:15	UV 254 nm
379	Methylphenylsuccinimide	C11 H11 N O2	3	ACN:H2O 40:60	UV 254 nm
380	Metixene	C20 H23 N S	1	Hexane:2-PrOH 90:10	UV 254 nm
381	Metoprolol	C15 H25 N O3	2	Hexane:2-PrOH:DEA 90:10:0.01	UV 254 nm
382	Metoprolol	C15 H25 N O3	2	Hexane:2-PrOH(10mMOctNH2)90:10	UV 254 nm
383	Metoprolol	C15 H25 N O3	2	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
384	Metoprolol	C15 H25 N O3	2	Hexane:EtOH 90:10	UV 254 nm
385	Metoprolol	C15 H25 N O3	2	Hexane:2-PrOH:DEA 91:8:1	UV 254 nm
386	Metoprolol	C15 H25 N O3	2	Hexane:EtOH:DEA 90:10:0.1	UV 220 nm
387	Mianserin	C18 H20 N2	3	Hexane:2-PrOH 90:10	UV 210 nm
388	Muscon	C16 H30 O	4	Hexane:2-PrOH 90:10	
389	3-(alpha-Naphthoxy)-nitropropan-2-ol	C13 H13 N O4	4	Hexane:2-PrOH 90:10	UV 270 nm
390	4-[1-(1-Naphthyl)-ethyl]-1H-imidazole	C15 H14 N2	2	Hexane:2-PrOH 90:10	UV 280 nm
391	1-Naphthyl-ethanol	C12 H12 O	3	Hexane:2-PrOH 90:10	UV 254 nm
392	1-(1-Naphthyl)-ethanol	C12 H12 O	9	Hexane:2-PrOH 90:10	UV 254 nm
393	1-(1-Naphthyl)-ethanol	C12 H12 O	2	Hexane:2-PrOH 90:10	UV 254 nm
394	1-(2-Naphthyl)-ethanol	C12 H12 O	3	Hexane:2-PrOH 90:10	UV 254 nm
395	Naproanilide	C19 H17 N O2	3	Hexane:2-PrOH 90:10	UV 254 nm
396	Napropamide	C17 H21 N O2	9	Hexane:2-PrOH 90:10	UV 254 nm
397	Naproxen	C14 H14 O3	2	Heptane:2-PrOH:TFA95:4.95:0.05	UV 230 nm
398	Nicardipine	C26 H29 N3 O6	2	Hexane:2-PrOH:EtOH 95:4:1	UV 255 nm
399	Nicardipine	C26 H29 N3 O6	3	Hexane:2-PrOH 87.5:12.5	UV 240 nm
400	Niguldipine	C35 H39 N3 O4	3	Hexane:2-PrOH 87.5:12.5	UV 240 nm
401	Nilvadipine	C19 H19 N3 O6	2	Hexane:2-PrOH:EtOH 95:4:1	UV 255 nm
402	Nimodipine	C21 H26 N2 O7	3	Hexane:2-PrOH 87.5:12.5	UV 240 nm
403	Nisoldipine	C20 H24 N2 O6	3	Hexane:2-PrOH 87.5:12.5	UV 240 nm
404	Nisoldipine	C20 H24 N2 O6	2	Hexane:2-PrOH:EtOH 95:4:1	UV 255 nm
405	Nisoldipine	C20 H24 N2 O6	3	Heptane:2-PrOH 88:12(+0.2%TFA)	UV 240 nm
406	Nitrendipine	C18 H20 N2 O6	1	Hexane:2-PrOH 90:10	UV 240 nm
407	Nitrendipine	C18 H20 N2 O6	3	Hexane:2-PrOH 87.5:12.5	UV 240 nm
408	1-Nitro-2-heptanol	C7 H15 N O3	4	Hexane:2-PrOH 90:10	UV 270 nm
409	3-Nitro-benzenesulfonate deriv.	C9 H9 N O6 S	2	Hexane:2-PrOH 80:20	UV 220 nm
410	4-Nitro-phenyloxy)propanoic acid methyl ester (2-	C10 H11 N O5	2	Hexane:2-PrOH:HCOOH 94.5:5:0.5	UV 260 nm
411	Nivaldipine	C19 H19 N3 O6	3	Hexane:2-PrOH 87.5:12.5	UV 240 nm
412	trans-5-Norbornene-2,3-dicarboxylic acid	C9 H10 O4	2	Hexane:2-PrOH:HCOOH 95:5:1	UV 214 nm
413	trans-5-Norbornene-2,3-dicarboxylic acid	C9 H10 O4	1	Hexane:2-PrOH:HCOOH 90:10:1	UV 214 nm
414	Nortricyclanol-phenylcarbamate	C14 H15 N O2	1	Hexane:2-PrOH 99:1	UV 254 nm
415	Norverapamil	C26 H36 N2 O4	1	Hexane:2-PrOH:EtOH 85:7.5:7.5	FI 272/317
416	1-O-Octadecyl-3-O-trityl-glycerol	C40 H58 O3	2	Hexane:2-PrOH 99.4:0.6	UV 254 nm
417	Ofloxacin methyl ester	C19 H22 F N3 O4	4	Hexane:EtOH 80:20	UV 254 nm
418	Oltran	C4 H10 N O3 P S	9	Hexane:2-PrOH 90:10	UV 220 nm
419	Omeprazole	C17 H19 N3 O3 S	1	Hexane:EtOH 80:20	UV 254 nm
420	Omeprazole	C17 H19 N3 O3 S	9	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
421	Omeprazole deriv.	C16 H17 N3 O S	9	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
422	Orphenadrine	C18 H23 N O	2	Hexane:2-PrOH 90:10	UV 254 nm
423	Oxazepam	C15 H11 Cl N2 O2	9	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
424	Oxazepam	C15 H11 Cl N2 O2	3	Hexane:2-PrOH 90:10	UV 254 nm
425	Oxazepam	C15 H11 Cl N2 O2	4	Hexane:EtOH 90:10	UV 254 nm
426	Oxindole deriv.	C15 H20 N2 O4	2	Hexane:2-PrOH 90:10	UV 254 nm
427	Oxindole deriv.	C20 H20 N4 O7	2	Hexane:EtOH 90:10	UV 254 nm
428	Oxiracetam	C6 H10 N2 O3	9	Hexane:EtOH 75:25	UV 205 nm
429	Oxprenolol	C15 H23 N O3	2	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
430	Oxyphenecyclimine	C20 H28 N2 O3	1	Hexane:2-PrOH 90:10	UV 254 nm
431	Paracyclophane [2.2]- deriv.	C23 H21 N3 O2	2	Hexane:2-PrOH 90:10	UV 254 nm
432	Penbutolol	C17 H27 N O2	2	Hexane:2-PrOH:DEA 90:10:0.4	UV 254 nm
433	Pentane-2,4-diol-diphenylcarbamate	C19 H22 N2 O4	2	Hexane:2-PrOH 80:20	UV 254 nm
434	2,4-Pentanedionate-(tris)-ruthenium (III)	C15 H21 O6 Ru	9	Hexane:2-PrOH 90:10	UV 270 nm
435	Perisoxal	C16 H20 N2 O2	2	Hexane:2-PrOH 90:10	UV 254 nm
436	Perisoxal	C16 H20 N2 O2	2	Hexane:2-PrOH:DEA 90:10:0.1	UV 254 nm
437	1-Phenoxy-2-propanol	C9 H12 O2	2	1.3 M 2-PrOH in Hexane	UV 254 nm
438	1-Phenoxy-2-propanol	C9 H12 O2	2	1.3 M Benzene in ACN	UV 254 nm

No.	COMPOUND	FORMULA	COLUMN	ELUENT	DETECTION
439	1-Phenoxy-2-propanol	C9 H12 O2	2	1.3 M 2-PrOH in ACN	UV 254 nm
440	1-Phenoxy-2-propanol	C9 H12 O2	2	ACN	UV 254 nm
441	1-Phenoxy-2-propanol	C9 H12 O2	2	Hexane:2-PrOH 90:10	UV 254 nm
442	1-Phenoxy-2-propanol	C9 H12 O2	2	ACN:H2O 40:60	UV 254 nm
443	(3E)-[2-(2'-Phenoxy-isopropyl)oxy]pentenenitrile	C14 H17 N O2	2	Hexane:2-PrOH 99.75:0.25	UV 254 nm
444	2-Phenoxy-propanoic acid	C9 H10 O3	2	Hexane:2-PrOH:HCOOH 90:10:1	UV 254 nm
445	2-Phenoxy-propanoic acid	C9 H10 O3	1	Hexane:2-PrOH:HCOOH 90:10:1	UV 254 nm
446	2-Phenoxy-propionic acid methyl ester	C10 H12 O3	3	Hexane:2-PrOH 90:10	UV 254 nm
447	N-Phenoxycarbonyl-alanine benzyl ester	C17 H17 N O4	9	Hexane:2-PrOH 80:20	UV 254 nm
448	N-Phenoxycarbonyl-alanine benzyl ester	C17 H17 N O4	1	Hexane:2-PrOH 90:10	UV 254 nm
449	N-Phenoxycarbonyl-alanine ethyl ester	C12 H15 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
450	N-Phenoxycarbonyl-alanine ethyl ester	C12 H15 N O4	1	Hexane:2-PrOH 90:10	UV 254 nm
451	1-Phenyl-1-hexanol	C12 H18 O	2	Hexane:2-PrOH 98:2	UV 254 nm
452	1-Phenyl-1-propanol	C9 H12 O	2	Hexane:2-PrOH 98:2	UV 254 nm
453	1-Phenyl-hept-1-yn-3-ol	C13 H16 O	2	Hexane:2-PrOH 95:5	UV 254 nm
454	1-Phenyl-pentan-3-ol	C11 H16 O	2	Hexane:2-PrOH 95:5	UV 254 nm
455	1-Phenyl-propyn-1-ol	C9 H8 O	3	Hexane:2-PrOH 90:10	UV 254 nm
456	2-Phenyl-1-benzopyran-4-one	C15 H12 O2	2	Hexane:2-PrOH 90:10	UV 254 nm
457	2-Phenyl-1-benzopyran-4-one	C15 H12 O2	1	(SFC) CO2:2-PrOH 96:4	UV 254 nm
458	2-Phenyl-2-butanol	C10 H14 O	2	Hexane:2-PrOH 98:2	UV 254 nm
459	2-Phenyl-4-hydroxymethyl-2-oxazoline	C10 H11 N O2	2	Hexane:2-PrOH 75:25	UV 264 nm
460	2-Phenyl-butanoic acid	C10 H12 O2	2	ACN:0.05 N NaClO4(pH 2) 60:40	UV 254 nm
461	2-Phenyl-butanoic acid	C10 H12 O2	2	ACN:0.5 M NaClO4 (pH 2) 40:60	UV 254 nm
462	2-Phenyl-cyclohexanone	C12 H14 O	9	Hexane:2-PrOH 90:10	UV 254 nm
463	2-Phenyl-cyclohexanone	C12 H14 O	2	Hexane:2-PrOH 90:10	UV 254 nm
464	2-Phenyl-cyclohexanone	C12 H14 O	3	EtOH:H2O 96:4	UV 254 nm
465	2-Phenyl-cyclohexanone	C12 H14 O	4	Hexane:2-PrOH 90:10	UV 254 nm
466	2-Phenyl-propanoic acid	C9 H10 O2	1	Hexane:2-PrOH:TFA 90:10:1	UV 254 nm
467	2-Phenyl-propanoic acid methyl ester	C10 H12 O2	3	Hexane:2-PrOH 90:10	UV 254 nm
468	2-Phenyl-propionic acid	C9 H10 O2	2	Hexane:2-PrOH:TFA 98:2:1	UV 254 nm
469	3-Phenyl-butanoic acid	C10 H12 O2	2	ACN:0.5 M NaClO4 (pH 2) 40:60	UV 254 nm
470	3-Phenyl-butanoic acid methyl ester	C11 H14 O2	3	Hexane:2-PrOH 90:10	UV 254 nm
471	4-Phenyl-1,3-dioxane	C10 H12 O2	2	Hexane:2-PrOH 90:10	UV 254 nm
472	4-Phenyl-2-butanol	C10 H14 O	2	1.3 M 2-PrOH in Hexane	UV 254 nm
473	4-Phenyl-2-butanol methyl ether	C11 H16 O	2	1.3 M 2-PrOH in ACN	UV 254 nm
474	4-Phenyl-2-butanol methyl ether	C11 H16 O	2	1.3 M 2-PrOH in Hexane	UV 254 nm
475	4-Phenyl-2-butanol methyl ether	C11 H16 O	2	ACN	UV 254 nm
476	5-Phenyl-1,3-pentan-diol	C11 H16 O2	2	Hexane:2-PrOH 95:5	UV 254 nm
477	5-Phenyl-2,2-dimethyl-1,3-pentandiol	C13 H20 O2	2	Hexane:2-PrOH 95:5	UV 254 nm
478	trans-Phenyl-cyclopropane carboxylic acid	C10 H10 O2	2	Hexane:2-PrOH:HCOOH 90:10:1	UV 254 nm
479	trans-1-Phenyl-2(4chlorophenyl)cyclopropane	C15 H13 Cl	2	Hexane:2-PrOH 90:10	UV 254 nm
480	Phenylcarbamate-2-butenol	C11 H13 N O2	2	Hexane:2-PrOH 90:10	UV 254 nm
481	Phenylcarbamate-2-butenol	C11 H13 N O2	9	Hexane:2-PrOH 98:2	UV 254 nm
482	Phenylcarbamate-2-isopentanol	C12 H17 N O2	9	Hexane:2-PrOH 98:2	UV 254 nm
483	Phenylcarbamate-2-isopentanol	C12 H17 N O2	2	Hexane:2-PrOH 90:10	UV 254 nm
484	Phenylcarbamate-2-octanol	C15 H23 N O2	9	Hexane:2-PrOH 98:2	UV 254 nm
485	Phenylcarbamate-2-octanol	C15 H23 N O2	2	Hexane:2-PrOH 90:10	UV 254 nm
486	Phenylcarbamate-2-pentanol	C12 H17 N O2	2	Hexane:2-PrOH 90:10	UV 254 nm
487	Phenylcarbamate-2-pentanol	C12 H17 N O2	9	Hexane:2-PrOH 98:2	UV 254 nm
488	Phenylcarbamate-3-octanol	C15 H23 N O2	2	Hexane:2-PrOH 90:10	UV 254 nm
489	Phenylcarbamate-3-octanol	C15 H23 N O2	9	Hexane:2-PrOH 98:2	UV 254 nm
490	Phenylethyl benzoate	C15 H14 O2	2	Hexane:2-PrOH 98:2	UV 254 nm
491	1-Phenylethyl-phenylcarbamate	C15 H15 N O2	9	Hexane:2-PrOH 90:10	UV 254 nm
492	1-Phenylethyl-phenylcarbamate	C15 H15 N O2	2	Hexane:2-PrOH 90:10	UV 254 nm
493	Pimobendan	C19 H18 N4 O2	2	Hexane:EtOH:DEA 75:25:0.1	UV 328 nm
494	Pimobendan	C19 H18 N4 O2	4	Hexane:2-PrOH 50:50	UV 328 nm
495	Pindolol	C14 H20 N2 O2	2	ACN:H2O(0.1M NaPF6) 40:60	UV 254 nm
496	Pindolol	C14 H20 N2 O2	9	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
497	Pindolol	C14 H20 N2 O2	2	Hexane:2-PrOH:DEA 70:30:0.05	UV 254 nm
498	Pindolol	C14 H20 N2 O2	2	Hexane:2-PrOH 70:30	UV 254 nm
499	Pindolol	C14 H20 N2 O2	2	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
500	Pindolol	C14 H20 N2 O2	2	ACN:H2O(1N NaClO4) 60:40	UV 254 nm
501	alpha-Pivaloylamino-etioorphyrin	C37 H47 N5 O	2	Hexane:EtOH:CHCl3 70:20:10	UV 410 nm

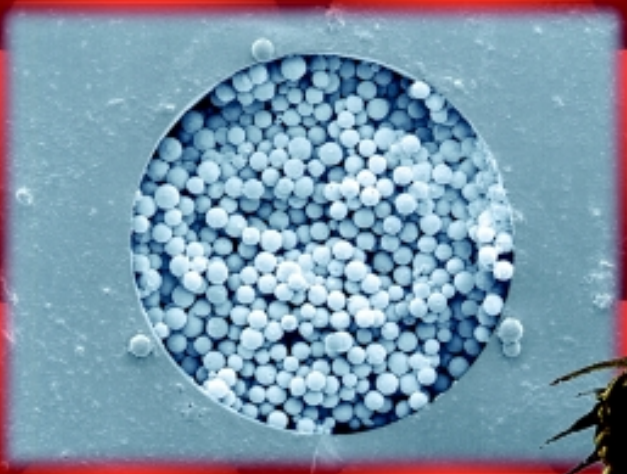
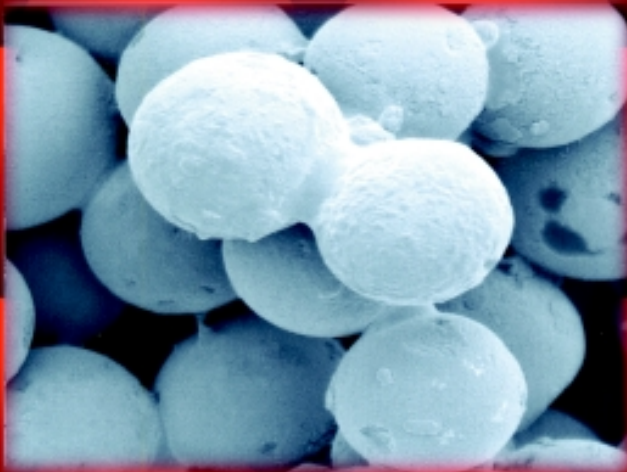
No.	COMPOUND	FORMULA	COLUMN	ELUENT	DETECTION
502	alpha-Pivaloylamino-etiochlorophyllin copper	C37 H45 Cu N5 O	2	Hexane:EtOH:CHCl3 70:20:10	UV 410 nm
503	alpha-Pivaloylamino-etiochlorophyllin zinc	C37 H45 N5 O Zn	2	Hexane:EtOH:CHCl3 70:20:10	UV 410 nm
504	Propafenone	C21 H27 N O3	1	Hexane:2-BuOH:DEA 93:7:0.2	UV 254 nm
505	Propafenone	C21 H27 N O3	1	Hexane:2-PrOH:DEA 75:25:0.2	UV 254 nm
506	Propafenone	C21 H27 N O3	2	Hexane:2-BuOH:DEA 93:7:0.2	UV 254 nm
507	Propane-1,2-diol-diphenylcarbamate	C17 H18 N2 O4	2	Hexane:2-PrOH 80:20	UV 254 nm
508	Propranolol	C16 H21 N O2	2	ACN:H2O(0.1M NaPF6) 40:60	UV 254 nm
509	Propranolol	C16 H21 N O2	2	Hexane:2-PrOH:DEA 90:10:0.1	UV 254 nm
510	Propranolol	C16 H21 N O2	2	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
511	Propranolol	C16 H21 N O2	2	ACN:H2O(0.5M NaClO4) 40:60	UV 254 nm
512	Propranolol	C16 H21 N O2	2	Hexane:2-PrOH:DEA 91:8:1	UV 254 nm
513	Propranolol	C16 H21 N O2	2	ACN:0.5 M NaClO4 (pH 2) 40:60	UV 254 nm
514	Propranolol	C16 H21 N O2	2	Hex.:2-PrOH:EtOH:DEA 80:5:15	UV 254 nm
515	Propranolol	C16 H21 N O2	2	Hex.:2-PrOH:NOctMe2 92:8:0.01	UV 254 nm
516	2-Propyl-3-(4-chlorophenyl)propanoic acid methyl ester	C13 H17 Cl O3	3	Hexane:2-PrOH 99:1	UV 220 nm
517	N-Propyl-2-amino-5-hydroxy-tetralin (salt)	C13 H19 N O	2	Hexane:EtOH 95:5	UV 225 nm
518	N-Propyl-2-amino-5-methoxy-tetralin (salt)	C14 H21 N O	2	Hexane:EtOH 90:10	UV 225 nm
519	N-Propyl-2-amino-5-methoxy-tetralin (salt)	C14 H21 N O	2	Hexane:EtOH 95:5	UV 225 nm
520	Pyridoglutethimide	C12 H14 N2 O2	3	Hexane:2-PrOH 50:50	UV 257 nm
521	Pyridoglutethimide	C12 H14 N2 O2	2	Hexane:2-PrOH 65:35	UV 257 nm
522	Pyrimidine deriv.	C12 H17 N5	3	Hexane:2-PrOH 90:10	UV 254 nm
523	Pyriproxyfen (Sumilarv)	C20 H19 N O3	3	Hexane:MeOH 95:5	UV 254 nm
524	Saterinone	C27 H30 N4 O4	2	MeOH	UV 254 nm
525	Scopolamine	C17 H21 N O4	2	Hexane:EtOH:DEA 80:20:0.1	UV 254 nm
526	Secobarbital	C12 H18 N2 O3	3	Hexane:2-PrOH:HAc 95:5:0.5	UV 220 nm
527	Shikalkin (Shikonin and alkannin)	C16 H16 O5	2	Hexane:2-PrOH 90:10	VIS 520 nm
528	Sotalol	C12 H20 N2 O3 S	1	Hexane:EtOH:DEA 85:15:2	UV 254 nm
529	Sotalol	C12 H20 N2 O3 S	1	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
530	Stylopine	C19 H17 N O4	9	EtOH	UV 254 nm
531	Sulconazole	C18 H15 Cl3 N2 S	3	Hexane:2-PrOH 90:10	UV 254 nm
532	Sulindac methyl ester	C21 H19 F O3 S	1	Hexane:2-PrOH 90:10	UV 254 nm
533	Sulpiride	C15 H23 N3 O4 S	3	Hexane:EtOH 95:5	UV 254 nm
534	Tertatolol-hydrochlorid	C16 H25 N O2 S	2	Hexane:2-PrOH:DEA 50:50:0.4	UV 254 nm
535	1,2,2,2-Tetra-phenyl-ethane-1-ol	C26 H22 O	2	Hexane:2-PrOH 90:10	UV 254 nm
536	Tetrahydrofurfuryl-alkohol-phenylcarbamate	C12 H15 N O3	2	Hexane:2-PrOH 80:20	UV 254 nm
537	Tetrahydroajtrorrhizine	C20 H23 N O4	9	EtOH	UV 254 nm
538	Tetrahydropalmatine	C21 H25 N O4	9	EtOH	UV 254 nm
539	Tetrahydropalmatine	C21 H25 N O4	2	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
540	2-Tetralol	C10 H12 O	2	Hexane:2-PrOH 98:2	UV 254 nm
541	1,2,2,2-Tetraphenyl-ethanol	C26 H22 O	1	Hexane:2-PrOH 90:10	UV 254 nm
542	1,2,2,2-Tetraphenyl-ethanol	C26 H22 O	3	(SFC) CO2:2-PrOH 96:4	UV 254 nm
543	1,2,2,2-Tetraphenyl-ethanol	C26 H22 O	9	(SFC) CO2:2-PrOH 96:4	UV 254 nm
544	Thalidomide	C13 H10 N2 O4	3	Hexane:EtOH 50:50	UV 254 nm
545	Tiaprofenic acid	C14 H12 O3 S	1	Hexane:2-PrOH:TFA 95:5:1	UV 254 nm
546	Timolol maleate	C13 H24 N4 O3 S	2	Hexane:2-PrOH:DEA 95:5:0.4	UV 224 nm
547	Timolol maleate	C13 H24 N4 O3 S	2	Hexane:2-PrOH:DEA 90:10:0.4	UV 224 nm
548	Timolol maleate	C13 H24 N4 O3 S	2	Hexane:2-PentOH:DEA 95:5:0.4	UV 224 nm
549	Timoprazole	C13 H11 N3 O S	1	Hexane:EtOH 80:20	UV 254 nm
550	Tolamolol	C19 H24 N2 O4	2	Hexane:EtOH:DEA 20:80:0.4	UV 254 nm
551	2-(m-Tolyl-oxy)-propanoic acid	C10 H12 O3	2	Hexane:2-PrOH:HCOOH 94.5:5:0.5	UV 260 nm
552	2-(m-Tolyl-oxy)-propanoic acid methyl ester	C11 H14 O3	2	Hexane:2-PrOH:HCOOH 94.5:5:0.5	UV 260 nm
553	2-(o-Tolyl-oxy)-propanoic acid	C10 H12 O3	2	Hexane:2-PrOH:HCOOH 94.5:5:0.5	UV 260 nm
554	o-Tolyl-oxy-propanoic acid ethyl ester (2-	C12 H16 O3	2	Hexane:2-PrOH 90:10	UV 260 nm
555	2-(o-Tolyl-oxy)-propanoic acid methyl ester	C11 H14 O3	2	Hexane:2-PrOH:HCOOH 94.5:5:0.5	UV 260 nm
556	Triadimefon	C14 H16 Cl N3 O2	3	Hexane:2-PrOH 98:2	UV 254 nm
557	Tricarbonylchromium deriv.	C9 H11 N O.Cr(CO)3	3	Hexane:2-PrOH 90:10	UV 254 nm
558	Tricarbonylchromium deriv.	C9 H12 O.Cr(CO)3	2	Hexane:EtOH 98.5:1.5	UV 254 nm
559	Tricarbonylchromium deriv.	C9 H12 O2.Cr(CO)3	2	Hexane:EtOH 96.5:3.5	UV 254 nm
560	Tricarbonylchromium deriv.	C9 H12 O.Cr(CO)3	2	Hexane:EtOH 98.5:1.5	UV 254 nm
561	Tricarbonylchromium deriv.	C9 H10 O2.Cr(CO)3	2	1.3 M 2-PrOH in Hexane	UV 220 nm
562	Tricarbonylchromium deriv.	C9 H10 O.Cr(CO)3	2	Hexane:EtOH 93.5:6.5	UV 254 nm
563	Tricarbonylchromium deriv.	C9 H10 O2.Cr(CO)3	2	Hexane:EtOH 95:5	UV 254 nm
564	Tricarbonylchromium deriv.	C15 H22 O2.Cr(CO)3	2	Hexane:EtOH 92:8	UV 254 nm

No.	COMPOUND	FORMULA	COLUMN	ELUENT	DETECTION
565	Tricarbonylchromium deriv.	C15 H22 O. Cr(CO)3	2	Hexane:EtOH 92:8	UV 254 nm
566	Tricarbonylchromium deriv.	C9 H12 O. Cr(CO)3	2	Hexane:EtOH 91.7:8.3	UV 254 nm
567	Tricarbonylchromium deriv.	C9 H12 O2. Cr(CO)3	2	Hexane:EtOH 91.5:8.5	UV 254 nm
568	Tricarbonylchromium deriv.	C10 H12 O2. Cr(CO)3	2	1.3 M 2-PrOH in Hexane	UV 220 nm
569	Tricarbonylchromium deriv.	C8 H10 O. Cr(CO)3	2	1.3 M 2-PrOH in Hexane	UV 220 nm
570	Tricarbonylchromium deriv.	C9 H12 O. Cr(CO)3	2	Hexane:EtOH 96.7:3.3	UV 254 nm
571	Tricarbonylchromium deriv.	C15 H24 O2. Cr(CO)3	2	Hexane:EtOH 97:3	UV 254 nm
572	Tricarbonylchromium deriv.	C8 H10 O. Cr(CO)3	2	1.3 M 2-PrOH in Hexane	UV 220 nm
573	Tricarbonylchromium deriv.	C9 H10 O2. Cr(CO)3	2	1.3 M 2-PrOH in Hexane	UV 220 nm
574	Tricarbonylchromium deriv.	C10 H12 O2. Cr(CO)3	2	1.3 M 2-PrOH in Hexane	UV 220 nm
575	Tricarbonylmanganese deriv.	C9 H10 O2. Mn(CO)3	2	1.3 M 2-PrOH in Hexane	UV 220 nm
576	Tricarbonylmanganese deriv.	C10 H12 O2. Mn(CO)3	2	1.3 M 2-PrOH in Hexane	UV 220 nm
577	Tricarbonylmanganese deriv.	C8 H10 O. Mn(CO)3	2	1.3 M 2-PrOH in Hexane	UV 220 nm
578	Tricarbonylmanganese deriv.	C9 H10 O2. Mn(CO)3	2	1.3 M 2-PrOH in Hexane	UV 220 nm
579	Trifluoroanthrylethanol	C16 H11 F3 O	2	Hexane:2-PrOH 90:10	UV 254 nm
580	Trifluoroanthrylethanol	C16 H11 F3 O	9	Hexane:2-PrOH 90:10	UV 254 nm
581	Trifluoroanthrylethanol	C16 H11 F3 O	4	Hexane:2-PrOH 90:10	UV 254 nm
582	Trifluoroanthrylethanol	C16 H11 F3 O	9	(SFC) CO2:2-PrOH 96:4	UV 254 nm
583	Trifluoroanthrylethanol	C16 H11 F3 O	3	(SFC) CO2:2-PrOH 96:4	UV 254 nm
584	Trifluoroanthrylethanol	C16 H11 F3 O	1	(SFC) CO2:2-PrOH 96:4	UV 254 nm
585	Trimebutine	C22 H29 N O5	3	Hexane:2-PrOH 90:10	UV 254 nm
586	Trisacetylacetonate Cobalt (III)	C15 H21 Co O6	9	Hexane:2-PrOH 90:10	
587	Tröger's base	C17 H18 N2	3	EtOH	UV 254 nm
588	Tröger's base	C17 H18 N2	3	Hexane:2-PrOH 90:10	UV 254 nm
589	Tröger's base	C17 H18 N2	2	Hexane:2-PrOH 90:10	UV 254 nm
590	Tröger's base	C17 H18 N2	1	Hexane:2-PrOH 90:10	UV 254 nm
591	Tröger's base	C17 H18 N2	9	Hexane:2-PrOH 90:10	UV 254 nm
592	Tröger's base	C17 H18 N2	4	Hexane:2-PrOH 90:10	UV 254 nm
593	Verapamil	C27 H38 N2 O4	1	Hexane:2-PrOH:EtOH 85:7.5:7.5	Fl 272/317
594	Verapamil	C27 H38 N2 O4	1	Hexane:2-PrOH 90:10	UV 254 nm
595	Verapamil	C27 H38 N2 O4	2	ACN:H2O(0.1M NaPF6) 40:60	UV 254 nm
596	Verapamil	C27 H38 N2 O4	2	ACN:H2O(0.5M NaClO4) 40:60	UV 254 nm
597	Verapamil	C27 H38 N2 O4	2	ACN:H2O(0.05M NaClO4, pH3) 2:1	UV 254 nm
598	Vinyl-phenyl sulfoxide	C8 H8 O S	2	Hexane:2-PrOH 90:10	UV 254 nm
599	Warfarin	C19 H16 O4	2	Hexane:2-PrOH:HCOOH 80:20:1	UV 254 nm
600	4-(m-Xylyl)-3,4-dimethyl-cyclopentenone	C14 H16 O	3	Hexane:2-PrOH 90:10	UV 254 nm
601	4-(p-Xylyl)-3,4-dimethyl-cyclopentenone	C14 H16 O	3	Hexane:2-PrOH 90:10	UV 254 nm
602	N-Z-(4-chlorophenyl)alanine ethyl ester	C19 H20 Cl N O4	1	Hexane:2-PrOH 90:10	UV 254 nm
603	N-Z-2-amino-3-phenyl-butanoic acid benzyl ester	C25 H25 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
604	N-Z-2-amino-3-phenyl-butanoic acid ethyl ester	C20 H23 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
605	N-Z-2-amino-4-pentenoic acid benzyl ester	C20 H21 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
606	N-Z-2-amino-butanoic acid benzyl ester	C19 H21 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
607	N-Z-2-amino-butanoic acid ethyl ester	C14 H19 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
608	N-Z-2-aminobutyric acid benzyl ester	C19 H21 N O4	1	Hexane:2-PrOH 90:10	UV 254 nm
609	N-Z-3-amino-butanoic acid ethyl ester	C14 H19 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
610	N-Z-4-chlorophenylalanine ethyl ester	C19 H20 Cl N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
611	N-Z-Ala-Ala benzyl ester (LD+DL)	C21 H24 N2 O5	2	Hexane:2-PrOH 83.3:16.7	UV 254 nm
612	N-Z-Ala-Ala benzyl ester (LL+DD)	C21 H24 N2 O5	2	Hexane:2-PrOH 83.3:16.7	UV 254 nm
613	N-Z-Ala-Phe benzyl ester (LD+DL)	C27 H28 N2 O5	2	Hexane:2-PrOH 83.3:16.7	UV 254 nm
614	N-Z-O-benzyl-tyrosine ethyl ester	C26 H27 N O5	2	Hexane:2-PrOH 90:10	UV 254 nm
615	N-Z-O-benzyl-tyrosine ethyl ester	C26 H27 N O5	1	Hexane:2-PrOH 90:10	UV 254 nm
616	N-Z-Phe-Ala benzyl ester (LD+DL)	C27 H28 N2 O5	2	Hexane:2-PrOH 83.3:16.7	UV 254 nm
617	N-Z-Phe-Ala benzyl ester (LL+DD)	C27 H28 N2 O5	2	Hexane:2-PrOH 83.3:16.7	UV 254 nm
618	N-Z-Phe-Phe benzyl ester (LD+DL)	C33 H32 N2 O5	2	Hexane:2-PrOH 83.3:16.7	UV 254 nm
619	N-Z-Phe-Phe benzyl ester (LL+DD)	C33 H32 N2 O5	2	Hexane:2-PrOH 83.3:16.7	UV 254 nm
620	N-Z-S-benzyl-cysteine benzyl ester	C25 H25 N O4 S	2	Hexane:2-PrOH 90:10	UV 254 nm
621	N-Z-S-benzyl-cysteine ethyl ester	C20 H23 N O4 S	2	Hexane:2-PrOH 90:10	UV 254 nm
622	N-Z-alanine	C11 H13 N O4	2	Hexane:2-PrOH:HCOOH 80:20:1	UV 254 nm
623	N-Z-alanine benzyl ester	C18 H19 N O4	9	Hexane:2-PrOH 80:20	UV 254 nm
624	N-Z-alanine benzyl ester	C18 H19 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
625	N-Z-alanine ethyl ester	C13 H17 N O4	9	Hexane:2-PrOH 80:20	UV 254 nm
626	N-Z-alanine ethyl ester	C13 H17 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
627	N-Z-alpha-amino-4-pentenoic acid benzyl ester	C20 H21 N O4	1	Hexane:2-PrOH 90:10	UV 254 nm

No.	COMPOUND	FORMULA	COLUMN	ELUENT	DETECTION
628	N-Z-asparagine	C12 H14 N2 O5	2	Hexane:2-PrOH:HCOOH 80:20:1	UV 254 nm
629	N-Z-asparagine benzyl ester	C19 H20 N2 O5	2	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
630	N-Z-asparagine ethyl ester	C14 H18 N2 O5	2	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
631	N-Z-aspartic acid	C12 H13 N O6	2	Hexane:2-PrOH:HCOOH 80:20:1	UV 254 nm
632	N-Z-aspartic acid diethyl ester	C16 H21 N O6	2	Hexane:2-PrOH 90:10	UV 254 nm
633	N-Z-glutamic acid dibenzyl ester	C27 H27 N O6	2	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
634	N-Z-glutamic acid diethyl ester	C17 H23 N O6	2	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
635	N-Z-glutamin benzyl ester	C20 H22 N2 O5	2	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
636	N-Z-glutamin ethyl ester	C15 H20 N2 O5	2	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
637	N-Z-histidine ethyl ester	C16 H19 N3 O4	2	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
638	N-Z-histidine ethyl ester	C16 H19 N3 O4	1	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
639	N-Z-isoleucine benzyl ester	C21 H25 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
640	N-Z-isoleucine ethyl ester	C16 H23 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
641	N-Z-leucine	C14 H19 N O4	2	Hexane:2-PrOH:HCOOH 80:20:1	UV 254 nm
642	N-Z-leucine	C14 H19 N O4	2	ACN:0.5 M NaClO4(pH2) 40:60	UV 254 nm
643	N-Z-leucine benzyl ester	C21 H25 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
644	N-Z-leucine ethyl ester	C16 H23 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
645	N-Z-leucine ethyl ester	C16 H23 N O4	1	Hexane:2-PrOH 90:10	UV 254 nm
646	N-Z-methionine	C13 H17 N O4 S	2	Hexane:2-PrOH:HCOOH 80:20:1	UV 254 nm
647	N-Z-methionine benzyl ester	C20 H23 N O4 S	2	Hexane:2-PrOH 90:10	UV 254 nm
648	N-Z-methionine benzyl ester	C20 H23 N O4 S	1	Hexane:2-PrOH 90:10	UV 254 nm
649	N-Z-methionine ethyl ester	C15 H21 N O4 S	2	Hexane:2-PrOH 90:10	UV 254 nm
650	N-Z-morleucine ethyl ester	C16 H23 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
651	N-Z-norleucine	C14 H19 N O4	2	Hexane:2-PrOH:HCOOH 80:20:1	UV 254 nm
652	N-Z-norleucine benzyl ester	C21 H25 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
653	N-Z-norvaline	C13 H17 N O4	2	Hexane:2-PrOH:HCOOH 80:20:1	UV 254 nm
654	N-Z-norvaline benzyl ester	C20 H23 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
655	N-Z-norvaline ethyl ester	C15 H21 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
656	N-Z-phenylalanine benzyl ester	C24 H23 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
657	N-Z-phenylalanine ethyl ester	C19 H21 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
658	N-Z-phenylglycine	C16 H15 N O4	2	Hexane:2-PrOH:HCOOH 80:20:1	UV 254 nm
659	N-Z-phenylglycine benzyl ester	C23 H21 N O4	1	Hexane:2-PrOH 90:10	UV 254 nm
660	N-Z-pipecolinic acid benzyl ester	C21 H23 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
661	N-Z-pipecolinic acid ethyl ester	C16 H21 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
662	N-Z-proline benzyl ester	C20 H21 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
663	N-Z-proline ethyl ester	C15 H19 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
664	N-Z-proline ethyl ester	C15 H19 N O4	1	Hexane:2-PrOH 90:10	UV 254 nm
665	N-Z-serine	C11 H13 N O5	2	Hexane:2-PrOH:HCOOH 80:20:1	UV 254 nm
666	Zileuton	C11 H12 N2 O2 S	1	Hexane:EtOH 90:10	UV 235 nm
667	N-Z-valine	C13 H17 N O4	2	Hexane:2-PrOH:HCOOH 80:20:1	UV 254 nm
668	N-Z-valine	C13 H17 N O4	2	ACN:0.05 N NaClO4 (pH 2) 60:40	UV 254 nm
669	N-Z-valine	C13 H17 N O4	2	ACN:0.1M phosphate(pH2.5)40:60	UV 254 nm
670	N-Z-valine	C13 H17 N O4	2	ACN:0.5M NaClO4(pH 4) 40:60	UV 254 nm
671	N-Z-serine ethyl ester	C13 H17 N O5	2	Hexane:2-PrOH 90:10	UV 254 nm
672	N-Z-serine ethyl ester	C13 H17 N O5	1	Hexane:2-PrOH 90:10	UV 254 nm
673	N-Z-valine ethyl ester	C15 H21 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
674	Zopiclone	C17 H17 Cl N6 O3	2	Hexane:EtOH 40:60	FI 300/470
675	Zopiclone-N-oxide	C17 H17 Cl N6 O4	2	Hex:EtOH:MeOH55:15:30(1%DEA)	FI 305/470
676	N-Z-serine benzyl ester	C18 H19 N O5	1	Hexane:2-PrOH 90:10	UV 254 nm
677	N-Z-tryptophane	C19 H18 N2 O4	2	Hexane:2-PrOH:HCOOH 80:20:1	UV 254 nm
678	N-Z-valine benzyl ester	C20 H23 N O4	2	Hexane:2-PrOH 90:10	UV 254 nm
679	N-Z-valine benzyl ester	C20 H23 N O4	1	Hexane:2-PrOH 90:10	UV 254 nm
680	N-Z-tryptophane ethyl ester	C21 H22 N2 O4	2	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
681	N-Z-tryptophane ethyl ester	C21 H22 N2 O4	1	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
682	N-Z-tryptophane benzyl ester	C26 H24 N2 O4	2	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm
683	N-Z-tryptophane benzyl ester	C26 H24 N2 O4	1	Hexane:2-PrOH:DEA 80:20:0.1	UV 254 nm

Stationary Phase	Phase description	Order Nr.	Particle Size	Pore Diameter	Field of Applications
CHIRA-GROM-1	Chiral polymer layer bound to silica	GSCH10891...	8 µm	1000 Å	Polar and unpolar phases for reversed- and normal-phase mode Taylor—made to the separation of enantiomeric pharmaceuticals, agrochemicals, flavorings, chiral drug monitoring, etc.
CHIRA-GROM-2	Chiral polymer layer bound to silica	GSCH20891...	4-, 8 µm	1000 Å	
CHIRA-GROM-3	Chiral polymer layer bound to silica	GSCH30891...	8 µm	1000 Å	
CHIRA-GROM-4	Chiral polymer layer bound to silica	GSCH40891...	8 µm	1000 Å	
CHIRA-GROM-9	Chiral polymer layer bound to silica	GSCH90891...	8 µm	1000 Å	

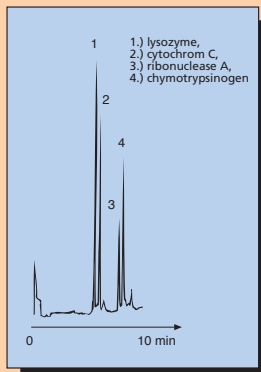
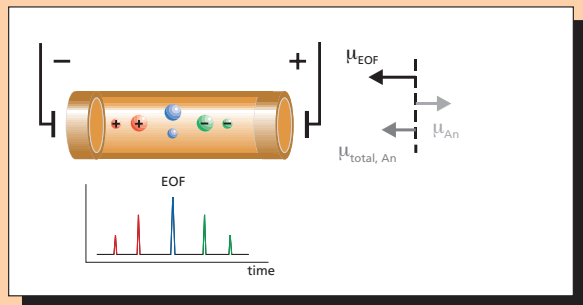
# Capillary-Electrochromatography



Figures show hydro-thermally sintered frit

# Capillaries for Capillary Electrophoresis (CE)

## Capillary Zone Electrophoresis (CZE)

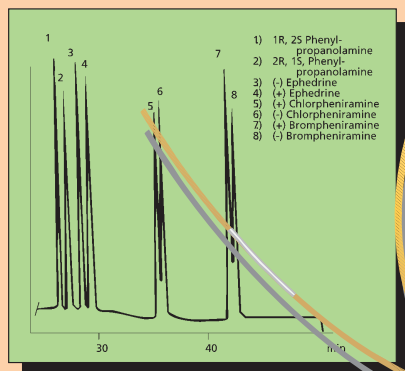


**Capillary:** GROM FuSi deactivated, 650 mm x 50 μm, **Buffer:** 0.1 M Na-phosphat, pH 6.0, **Operating Voltage:** 30 kV, **Detection (UV):** 280 nm, **Injection:** (el. migr.) 12 kV for 3 sec., **Sample:** ~ 5 mg/ml

All **GROM** FuSi-capillaries are manufactured, resp. formed from high strength, fused silica. They are coated with a protective polyimide-coating for high mechanical strength. This prevents breakage during handling. There are two types of uncoated capillaries available: The **untreated capillaries** feature a high degree of free silanol groups for enhanced EOF.

## β-Cyclodextrine-Coated Capillaries

The **GROM** FuSi β-cyclodex 100 is a fused silica capillary with a β-cyclodextrine phase permanently **bonded** to its inner-surface. Thus, the cyclodextrine acts as a selective complexing system. Inclusion complexes are formed by molecular species able to penetrate into the cavity of the cyclodextrine.



**Capillary GROM** FuSi β-cyclodextrine coated, 650 mm x 50 μm, **Buffer:** 0.1 M triethanolamine-phosphate, pH 2.5, 200 mg β-cyclodextrine, 5% ACN, 25% MeOH, **Operating voltage:** 30 kV, **Temperature:** 25°C, **Detection (UV):** 250 nm each, **Injection:** 1 sec (vac.), **Sample:** ~ 350 μg/ml

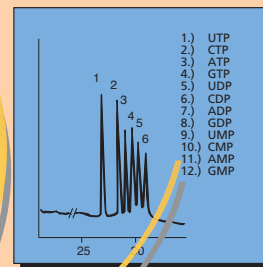
Therefore, this capillary column permits separations of a huge variety of optical and positional isomers by HPCE. Its use has also shown to be effective in the resolution of pharmaceutical enantiomers and inorganic ions.

They are excellent for dynamic- or custom, permanent coating. The **deactivated capillaries** however are optimized to reduce the wall adsorption caused by active silanol sites and thus yield highly reproducible results for instance when analysing proteins or peptides in non-denaturing conditions.

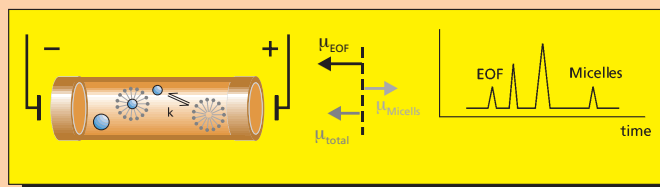
## Polyethylene Glycol Coated capillaries

**Capillary GROM** FuSi PEG-trimethoxysilane coated – 650 mm x 25 μm, **Buffer** 50 mM Tris-phosphate / pH 5.5, **Operating voltage** 30 kV, **Detection** 254 nm, **Injection** (el. migr.) 12 kV for 3 sec, **Sample** ~ 15 mg/ml

The **GROM** FuSi PEG 100 is a polymer coated fused silica capillary for the analysis of proteins, peptides, nucleotides etc. by capillary electrophoresis. It features a weakly hydrophilic, **polyethylene glycol-100 coated** surface that exhibits low hydrogen bonding surface, i.e. reactive areas of the inner-surface of the capillaries are reduced by cross-linking the PEG phase. This prevents the reactive regions of proteins from interacting with the silanol sites and nearly eliminates the electro-osmotic flow.



## Micellar Electrokinetic Capillary Chromatography



Especially **GROM** FuSi-200 HS-capillaries used for MEKC feature a chemically and hydrolytically stable, hydrophobic coating for separations by capillary electrophoresis. This slightly polar phase inhibits solute-to-surface interactions and improves the resolution of the analysis. In addition this coating diminishes the EOF permitting a wider usable range of pH and aqueous solutions to be explored during method development.

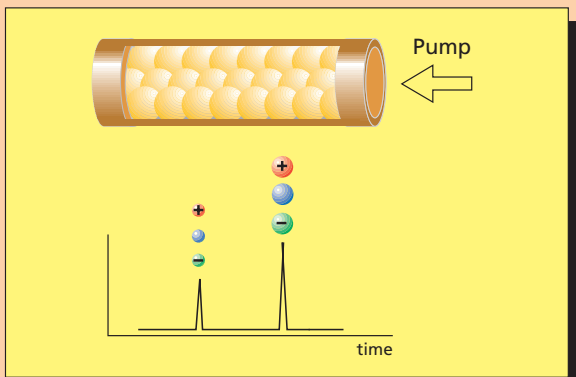
**Capillary:** GROM FuSi uncoated, 500 mm x 75 μm, **Buffer:** 50 mM Na-borate / 50 mM SDS, pH 9.5, 10% MeOH, **Operating voltage:** 22 kV, **Temperature:** 25°C, **Detection (UV):** 263 nm, **Injection:** 1 sec / 0.6 MPa, **Sample:** FMOC precolumn-derivatized amino acids

## Capillaries for capillary electrophoresis (CE)

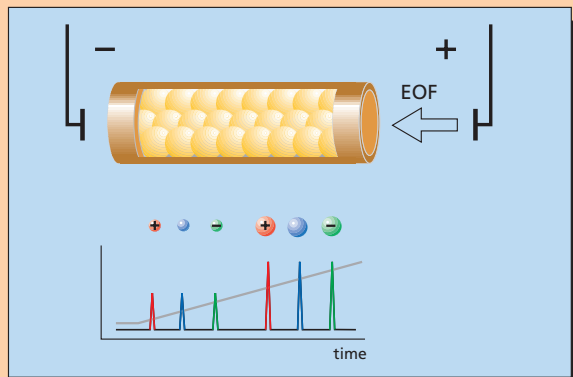
Order number	Description
CE-365050	GROM FuSi-untreated capillary, 50 μm i.d. - 360 μm o.d. - 100 cm length
CE-365075	GROM FuSi-untreated capillary, 75 μm i.d. - 360 μm o.d. - 100 cm length
CE-04250-C	GROM FuSi-deactivated capillary, 50 μm i.d. - 360 μm o.d. - 100 cm length
CE-04275-C	GROM FuSi-deactivated capillary, 75 μm i.d. - 360 μm o.d. - 100 cm length
CE-04050-PEG	GROM FuSi-PEG-100 coated capillary, 50 μm i.d. - 360 μm o.d. - 100 cm length
CE-04075-PEG	GROM FuSi-PEG-100 coated capillary, 75 μm i.d. - 360 μm o.d. - 100 cm length
CE-04050-CD	GROM FuSi-PEG-β-cyclodextrin coated capillary, 50 μm i.d. - 360 μm o.d. - 100 cm length
CE-04075-CD	GROM FuSi-PEG-β-cyclodextrin coated capillary, 75 μm i.d. - 360 μm o.d. - 100 cm length
CE-04150-HS	GROM FuSi-200 HS hydrophob., hydrolyt. stable coated capillary, 50 μm i.d. - 360 μm o.d. - 100 cm length
CE-04175-HS	GROM FuSi-200 HS hydrophob., hydrolyt. stable coated capillary, 75 μm i.d. - 360 μm o.d. - 100 cm length

# Columns for Capillary Electrochromatography (CEC)

## Capillary HPLC



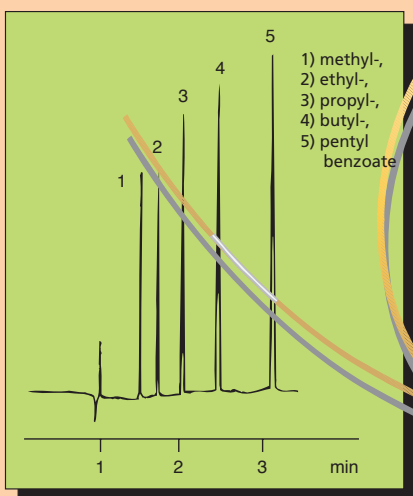
## Gradient Electrochromatography



Electrochromatography represents one of the most exciting, recent developments in the field of separation technologies. This unique method combines all the outstanding features and benefits inherent in modern HPLC and advanced capillary electrophoresis. It is readily performed in either the isocratic or in the gradient mode. Exceptional separations can thus be achieved when employing capillaries  $\leq 150$  mm in length packed either with porous or non-porous micro-particles. The electro osmotic flow eliminates restrictions in the length of the column normally encountered with small particle-sized packings as the result of prohibitively high back-pressures.

**References:** B. Behnke, E. Grom, E. Bayer, Journal of Chromatography A 716, 207–213 (1995)  
B. Behnke, E. Bayer, Journal of Chromatographie A 680, 93–98 (1994)

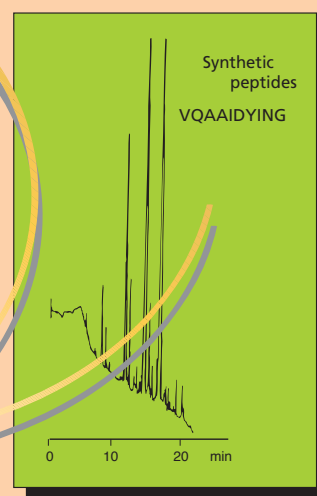
## Isocratic Capillary Electrochromatography



**Stationary phase:**  
GROM SIL 100  
ODS-2 FE, 1,5  $\mu$ m  
GROM CEC Column  
400 mm (150 mm)  
x 100  $\mu$ m  
**Operating voltage:**  
20 kV  
**Eluent A:** 80% ACN  
20% Buffer  
(5 mM Sodium-phosphate, pH 8)  
**Detection (UV):**  
254 nm  
**Injection:** (el. migr.)  
12 kV for 3 sec.  
**Sample:** benzoate test mixture

**Stationary phase:**  
GROM SIL 100  
ODS-2 FE, 1,5  $\mu$ m  
GROM CEC Column  
400 mm (150 mm)  
x 100  $\mu$ m  
**Operating voltage:**  
30 kV  
**Eluent A:** 0.1g/l  
TFA  
**Eluent B:** ACN  
**Gradient:** 0–95% B  
(0–20 min)  
**Detection (UV):**  
220 nm,  
**Injection:** (el. migr.)  
12 kV for 3 sec.  
**Sample:** synthetic peptides

## Gradient Capillary Electrochromatography



The **NovoGROM** capillary columns for CEC are available with inner diameters of 25  $\mu$ m, 50  $\mu$ m, 75  $\mu$ m, 100  $\mu$ m and 150  $\mu$ m. They can be packed with any of the stationary phases listed in the **GROM-HPLC** catalogue or with the customer's stationary phase.

**Acknowledgements:** Results and chromatogramms presented were kindly provided by B. Behnke, Inst. f. Org. Chem., University of Tübingen, Germany  
J. Räder and S. Webeler, Dept. f. Biotech., Fachhochschule Niederrhein, Krefeld, Germany

## Capillary columns for electrochromatography (CEC)

Order number	Description
***.....2534100	GROM CEC-capillary column 250 (340) x 0,1 mm
***.....4049100	GROM CEC-capillary column 400 (490) x 0,1 mm
***.....	GROM CEC-capillary columns are also available in other dimensions, please call for more informations

} Standard for Agilent technologies

# New Internet Catalogue



[www.grom.de](http://www.grom.de)

The unique, versatile HPLC column hardware for

# Combinatorial Chemistry



3.0, 4.0, 4.6 mm i.d.



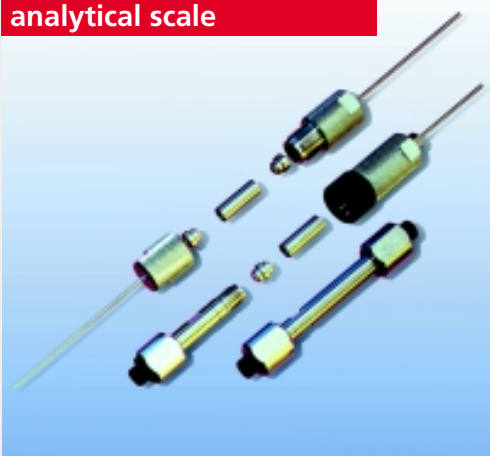
8.0 mm i.d.



20 or 30 mm i.d.

# NovoGROM HPLC Columns for combinatorial chemistry

## analytical scale



**10 or 20 x 4 mm**  
guard column, cartridge, complete

**50 x 4 mm**  
column with integrated guard column

**50 x 4 mm**  
column for conventional ferrule-type fitting

## semi-preparative scale

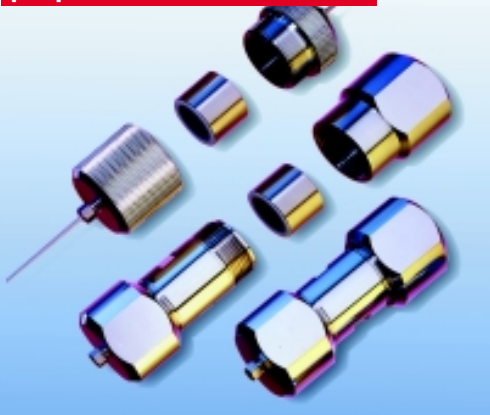


**10 or 20 x 8 mm**  
guard column cartridge, complete

**50 x 8 mm**  
column with integrated guard column

**50 x 8 mm**  
column for conventional ferrule-type fitting

## preparative scale



**10 or 20 x 20 mm, resp. x 30 mm**  
guard column cartridge, complete

**50 x 20 mm, resp. x 30 mm**  
column with integrated guard column

**50 x 20 mm, resp. x 30 mm**  
column for conventional ferrule-type fitting

- short columns
- integrated guard columns
- disposable guard column cartridges
- high versatility
- packed with all commonly available stationary phases

- ➔ fast separations
- ➔ low dispersion, i.e., no peak broadening
- ➔ cost saving, easy to use
- ➔ unique flexibility when "up-scaling"
- ➔ enables optimal selectivity

# Prepacked **NovoGROM** HPLC Columns dedicated to Combinatorial Chemistry

**Combinatorial Chemistry:** One of the most advanced, modern technologies requires a broad range in selectivity and excellent stability of stationary phases, while maintaining column durability and efficiency with good peak symmetry, especially for basic and acidic compounds. These important features are only guaranteed by a couple of the commonly available stationary phases such as **GROM-SIL phases**.

Outstanding Feature and Benefit of unique **NovoGROM** column hardware:

- Low-dispersion, i.e., no peak broadening by hardware void volume → Extraordinary performance even at high speed, therefore ensuring high sample throughput

**Combinatorial chemistry stainless steel columns, prepacked** preferably with:

Order number	Description
GSODS0511S0502	<b>NovoGROM</b> CombiChem column, 50 x 2.0 mm, packed with GROM- Sapphire (C18 / 5 µm / 110 Å)
GSOD30512S0502	<b>NovoGROM</b> CombiChem column, 50 x 2.0 mm, packed with GROM- SIL 120 ODS-3 CP (C18 / 5 µm / 120 Å)
GSOD40512S0502	<b>NovoGROM</b> CombiChem column, 50 x 2.0 mm, packed with GROM- SIL 120 ODS-4 HE (C18 / 5 µm / 120 Å)
GSODS0511S0504	<b>NovoGROM</b> CombiChem column, 50 x 4.0 mm, packed with GROM- Sapphire (C18 / 5 µm / 110 Å)
GSOD30512S0504	<b>NovoGROM</b> CombiChem column, 50 x 4.0 mm, packed with GROM- SIL 120 ODS-3 CP (C18 / 5 µm / 120 Å)
GSOD40512S0504	<b>NovoGROM</b> CombiChem column, 50 x 4.0 mm, packed with GROM- SIL 120 ODS-4 HE (C18 / 5 µm / 120 Å)
GSODS0511S0508	<b>NovoGROM</b> CombiChem column, 50 x 8 mm, packed with GROM- Sapphire (C18 / 5 µm / 110 Å)
GSOD30512S0508	<b>NovoGROM</b> CombiChem column, 50 x 8 mm, packed with GROM- SIL 120 ODS-3 CP (C18 / 5 µm / 120 Å)
GSOD40512S0508	<b>NovoGROM</b> CombiChem column, 50 x 8 mm, packed with GROM- SIL 120 ODS-4 HE (C18 / 5 µm / 120 Å)
GSODS0511S0520	<b>NovoGROM</b> CombiChem column, 50 x 20 mm, packed with GROM- Sapphire (C18 / 5 µm / 110 Å)
GSOD30512S0520	<b>NovoGROM</b> CombiChem column, 50 x 20 mm, packed with GROM- SIL 120 ODS-3 CP (C18 / 5 µm / 120 Å)
GSOD40512S0520	<b>NovoGROM</b> CombiChem column, 50 x 20 mm, packed with GROM- SIL 120 ODS-4 HE (C18 / 5 µm / 120 Å)
GSODS0511S0530	<b>NovoGROM</b> CombiChem column, 50 x 30 mm, packed with GROM- Sapphire (C18 / 5 µm / 110 Å)
GSOD30512S0530	<b>NovoGROM</b> CombiChem column, 50 x 30 mm, packed with GROM- SIL 120 ODS-3 CP (C18 / 5 µm / 120 Å)
GSOD40512S0530	<b>NovoGROM</b> CombiChem column, 50 x 30 mm, packed with GROM- SIL 120 ODS-4 HE (C18 / 5 µm / 120 Å)

**Note!** **NovoGROM** columns dedicated to Combinatorial Chemistry can be packed with any of the stationary phases listed in this catalogue (see pages 12/13 and 144).

**Combinatorial Chemistry low dispersion column hardware (stainless steel):\***

**Guard column cartridges to be used in conjunction with**  
guard column head or guard column holder

Order number	Dimensions / Quantity	Order number	Order number
**...V0101V	10 x 1.0 mm (Pk. of 5)	3551	2551
**...V0201V	20 x 1.0 mm (Pk. of 5)	3555	2555
**...V0102V	10 x 2.0 mm (Pk. of 5)	3551	2551
**...V0202V	20 x 2.0 mm (Pk. of 5)	3555	2555
**...V0104V	10 x 4.0 mm (Pk. of 5)	3101	2116
**...V0204V	20 x 4.0 mm (Pk. of 5)	3102	2115
**...V0108V	10 x 8.0 mm (Pk. of 2)	50.3111	50.2111
**...V0208V	20 x 8.0 mm (Pk. of 2)	50.3112	50.2112
**...V0120V	10 x 20 mm (Pk. of 2)	70.3111	70.2111
**...V0220V	20 x 20 mm (Pk. of 2)	70.3112	70.2112
**...V0230V	20 x 30 mm (Pk. of 1)	---	75.2112
**...V0330V	30 x 30 mm (Pk. of 1)	---	75.2113

\* Other dimensions upon request. For more detailed information concerning column hardware see pages 99 - 126.

\*\* Please, add abbreviation for the desired stationary phase.

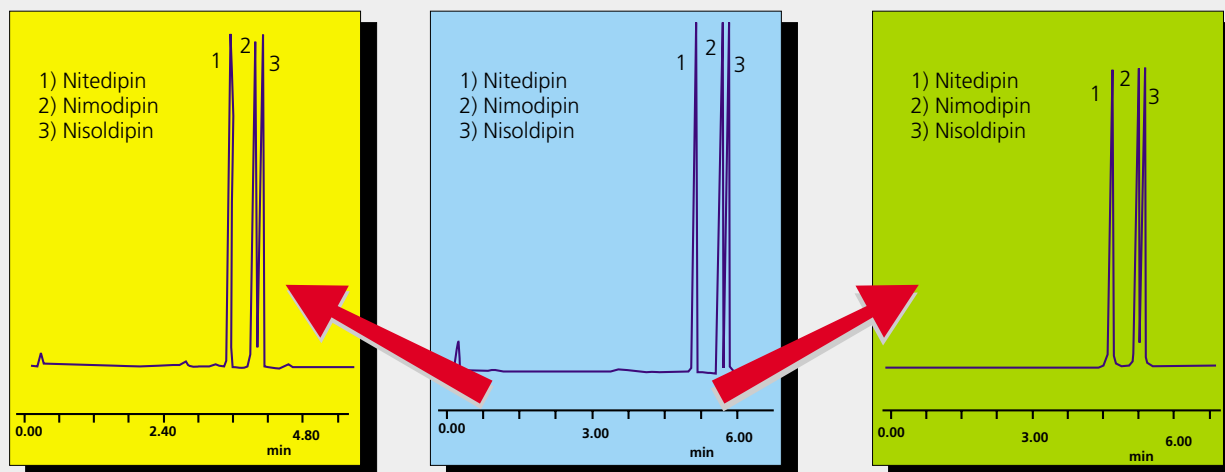
Combinatorial Chemistry **low dispersion column hardware** (stainless steel):\*

<i>CombiChem cartridge</i>	<i>CombiChem column</i>	
Order number	Order number	Dimensions
**...K0401	**...S0401	40 x 1.0 mm
**...K0501	**...S0501	50 x 1.0 mm
**...K0402	**...S0402	40 x 2.0 mm
**...K0502	**...S0502	50 x 2.0 mm
**...K0404	**...S0404	40 x 4.0 mm
**...K0504	**...S0504	50 x 4.0 mm
---	**...S0408	40 x 8.0 mm
---	**...S0508	50 x 8.0 mm
see guard column cartridge	**...S0320	30 x 20 mm
---	**...S0420	40 x 20 mm
---	**...S0520	50 x 20 mm
see guard column cartridge	**...S0330	30 x 30 mm
---	**...S0430	40 x 30 mm
---	**...S0530	50 x 30 mm
---	**...S0440	40 x 40 mm
---	**...S0540	50 x 40 mm
---	**...S0450	40 x 50 mm
---	**...S0550	50 x 50 mm

\* Other dimensions upon request. For more detailed information concerning column hardware see pages 99 - 126.

\*\* Please, add abbreviation for the desired stationary phase.

## Down-scaling and Up-scaling for the isolation of drugs

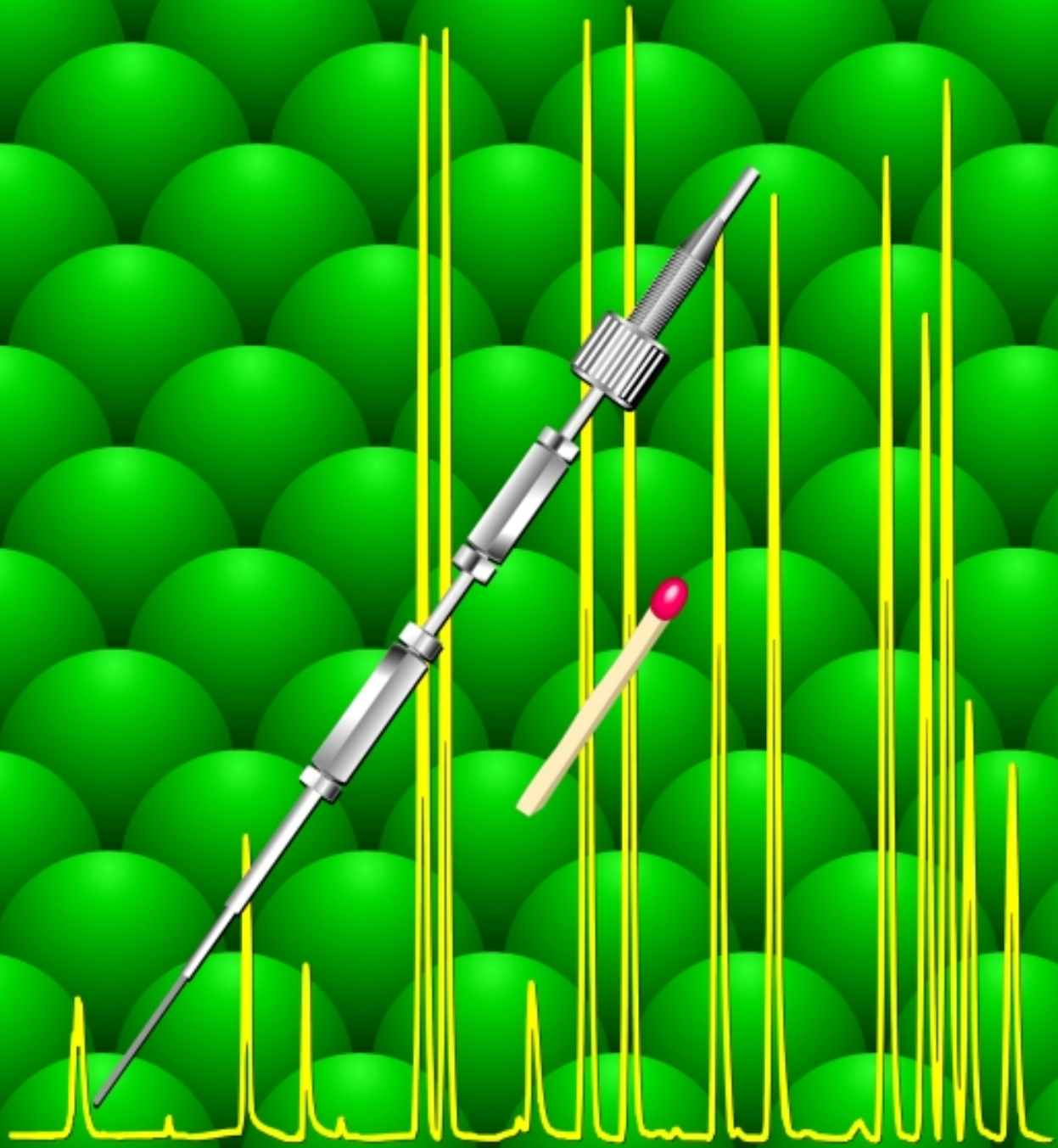


**Column phase:** GROM-SIL 120 ODS-3 CP, 3  $\mu$ m  
**Column size:** 30 x 4.0 mm  
**Eluent A:** H<sub>2</sub>O  
**B:** ACN  
**Gradient:** 10% B (0-1 min),  
 10-90% B (1-4.2 min),  
 90% B (4.2-5 min),  
 90-10% B (5-5.2 min)  
**Flow rate:** 2 ml/min  
**Pressure:** 13.8 MPa  
**Temperature:** RT  
**Detection (UV):** 254 nm  
**Injection:** 0.4 mg / 100  $\mu$ l

**Column phase:** GROM-SIL 120 ODS-3 CP, 5  $\mu$ m  
**Column size:** 50 x 4.0 mm  
**Eluent A:** H<sub>2</sub>O  
**B:** ACN  
**Gradient:** 10% B (0-2 min),  
 10-90% B (2-6 min),  
 90% B (6-7min),  
 90-10% B (7-7.2 min)  
**Flow rate:** 2 ml/min  
**Pressure:** 11.2 MPa  
**Temperature:** RT  
**Detection (UV):** 254 nm  
**Injection:** 0.4 mg / 100  $\mu$ l

**Column phase:** GROM-SIL 120 ODS-3 CP, 5  $\mu$ m  
**Column size:** 50 x 8 mm  
**Eluent A:** H<sub>2</sub>O  
**B:** ACN  
**Gradient:** 10% B (0-2 min),  
 10-90% B (2-6 min),  
 90% B (6-7min),  
 90-10% B (7-7.2 min)  
**Flow rate:** 8 ml/min  
**Pressure:** 13.2 MPa  
**Temperature:** RT  
**Detection (UV):** 254 nm  
**Injection:** 1.6 mg / 400  $\mu$ l

# Advanced + miniaturized **HPLC**



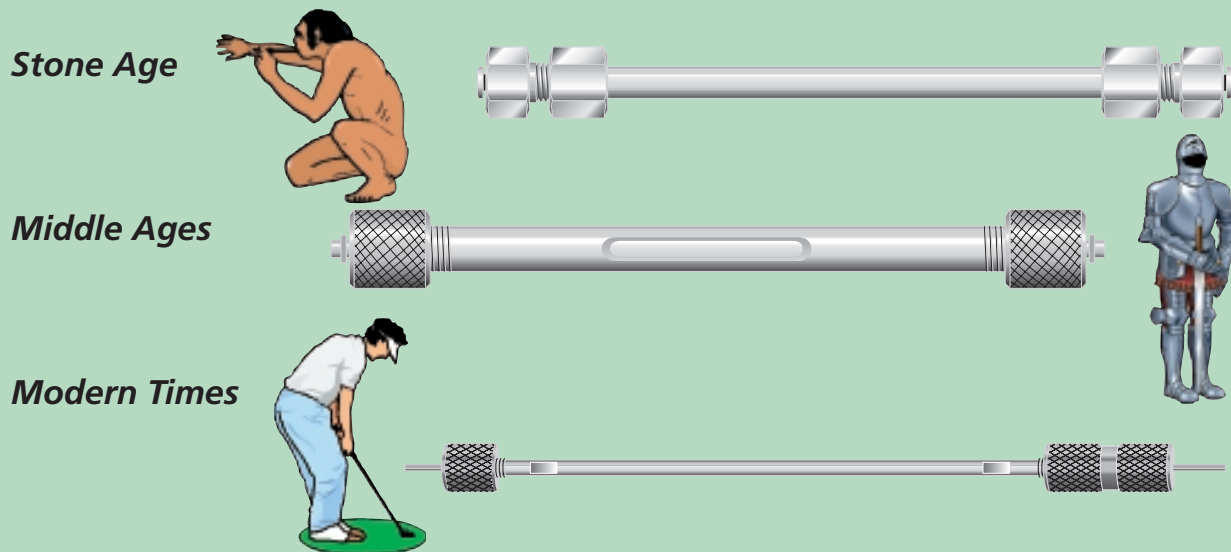
**Capillary- and High Speed HPLC**

# Take advantage of the benefits of **miniaturization** by employing **state-of-the-art HPLC**

All modern HPLC-pumps and, in conjunction with a solvent-splitting device, even any traditional HPLC-pump can easily maintain the low flow rates required for isocratic (often on-line coupled to a mass-spectrometer) or gradient elution in capillary HPLC.

Also, micro flow cells of UV detectors with 1.2  $\mu$ l or even 3 nl volume and 3 mm, respectively 8 mm path length are currently available. They can readily be used in place

of the standard analytical flow cells of HPLC detectors commonly used today. The risk of back-mixing caused by large volume detector cells is thus eliminated. Further, in addition to the benefits of drastically reduced solvent consumption, Micro HPLC may offer more than 200-fold enhanced sensitivity in accordance with Beer-Lambert's law when using such tiny micro flow cells.



## Enhanced sensitivity plus drastic solvent savings by using **smaller i.d. columns**

in. diameter [mm]	cross section [mm <sup>2</sup> ]	flow [ $\mu$ l/min]	solvent consumption	flowcell volume [ $\mu$ l]	path length [mm]	gain in sensitivity **
4.6	16.6	1 200	100%	15	10	1
4.0	12.6	910	75%	15	10	1.3
3.0	7.1	510	42%	15	10	2.4
2.0	3.1	224	19%	15 *	10	5.3
				5	6	3.2
				1.2	3	1.6
1	0.8	56	5%	15 *	10	21
				5	6	12.6
				1.2	3	6.3
500 $\mu$ m	0.2	15	1.2%	15 *	10	80
				5 *	6	48
				1.2	3	24
250 $\mu$ m	0.05	3.5	0.3%	15 *	10	340
				5 *	6	200
				1.2	3	100
				100 nl	0.3	10
				3 nl	8	270

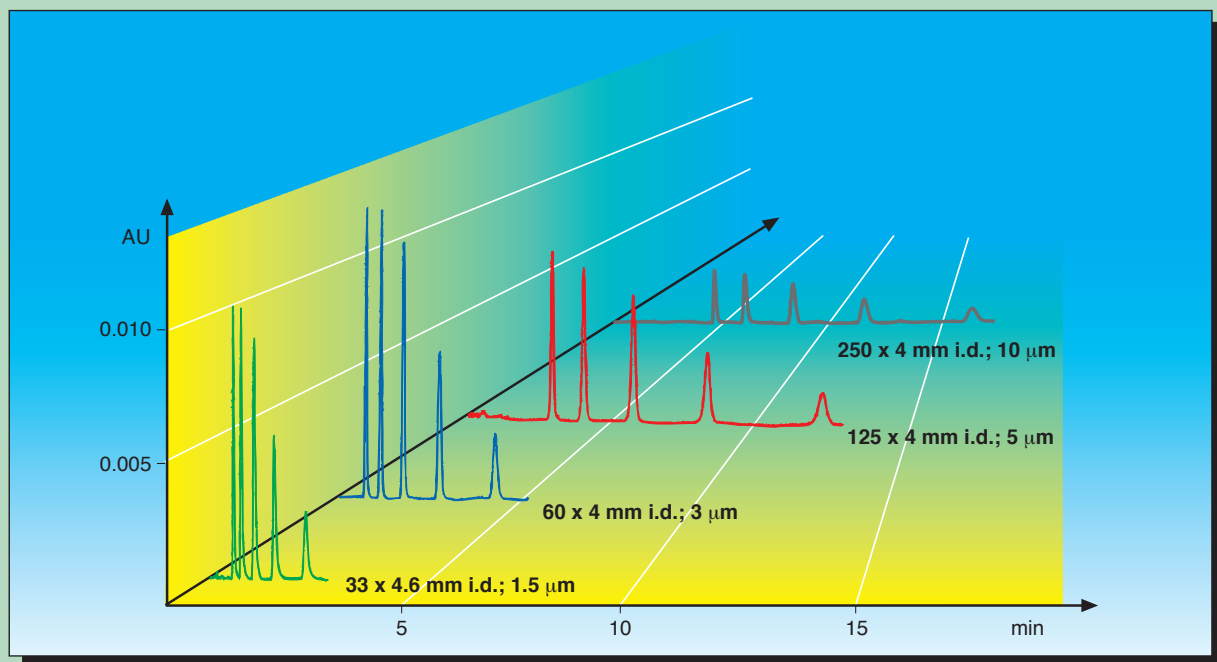
\* when optimal resolution is needed these flow cells must not be used for these columns

\*\* theoretical values

# Why use **short(er)** columns? ...

... **High Speed HPLC** with short columns offers numerous **advantages** and **benefits**:

- short analysis time – only 1/7 of standard HPLC
- low solvent consumption – only 1/5 of standard HPLC
- decreased diffusion / dispersion
- increased performance from minimum band broadening
- ➔ high sample through put, with tremendously reduced costs per analysis
- ➔ cost savings and improved environmental compatibility
- ➔ increased sensitivity –  $\geq 2$ -fold –
- ➔ higher number (N) of high equivalents of theoretical plates (HETP) per meter ( $\geq 4.5$ -fold)



Stationary phase: GROM-SIL 100 ODS-2 FE; Linear velocity: 0.8 mm/s; Eluent: ACN:H<sub>2</sub>O = \* 65:35, resp. \*\* 60:40; Flow cell: 1.2 µl / 3 mm with quick-connector (100 x 0.1 mm capillary); Injection: 5 µl benzoate test mixture / 1:100 dil. (methyl-, ethyl-, propyl-, butyl-, pentyl benzoate; 10–20 mg/ml)

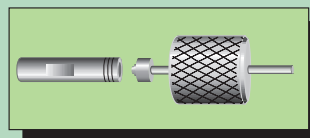
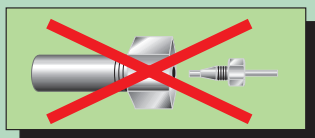
**Varying column length and particle size can substantially reduce runtimes and solvent consumption without compromising sensitivity or resolution**

Column Length Particle Size	Analysis Time [min]	Solvent Consumption [ml]	Sensitivity (1st peak) [AU]	Resolution (1. + 2nd peak)	N/m (5th peak)
250 x 4 mm * 10 µm	18.1	10.9	0.004	4.8	29 000
125 x 4 mm * 5 µm	9.4	5.6	0.008	5.2	72 200
60 x 4 mm ** 3 µm	4.8	2.9	0.013	4.6	129 300
33 x 4.6 mm * 1.5 µm	2.5	2.0	0.010	2.5	130 900

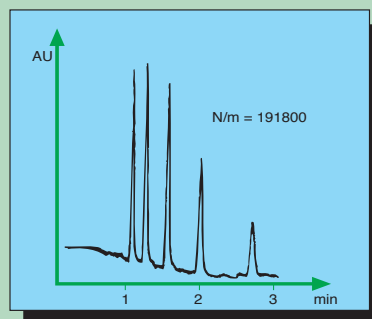
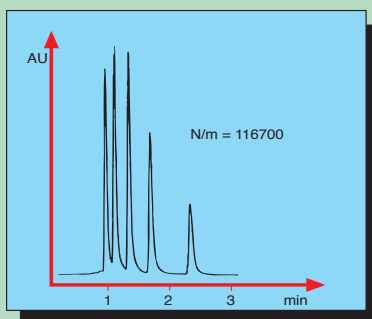
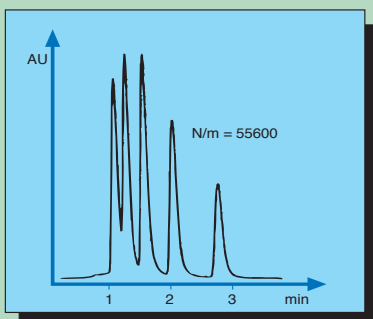
# To achieve the **very best results** in modern HPLC ...

For making use of microbore, capillary and high speed liquid chromatography only minor hardware changes are needed, resp. „*conditio sine qua non*“. Critical components include:

- **small flow cells** with appropriate internal volume and pathlength
- **connecting capillaries** (nearly dead volume-free) as short as possible,
- **low dispersion column hardware** guaranteeing maximum of chromatographical performance
- **flow splitter** or **high performance, low  $\mu\text{l}/\text{min}$  pump**



**Note!** It is seriously recommended to use exclusively capillaries with fitting adapters and quick-connectors rather than with ferrule-type fittings



## Same chromatographical conditions, except ...

analytical flow cell with (9  $\mu\text{l}$  / 6mm) with inlet capillary as supplied by manufacturer

analytical flow cell (9  $\mu\text{l}$  / 6mm) with fitting adapter capillaries (100 x 0.12 mm)

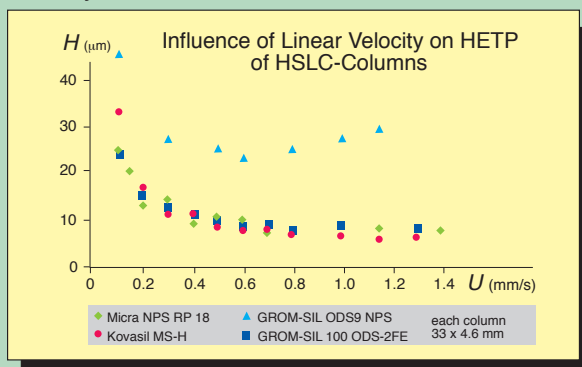
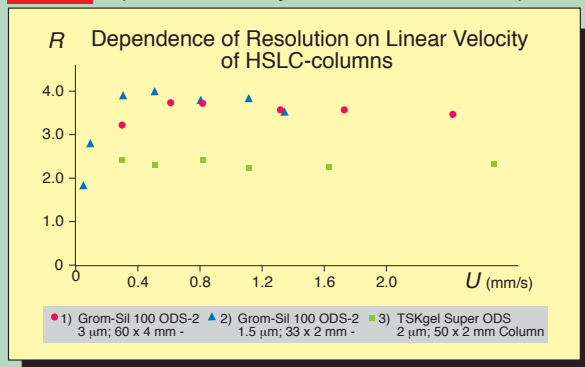
capillary flow cell (0.1  $\mu\text{l}$  / 0.3 mm) with fused silica inlet

## Different Flow Cells – Influence of Volume and Pathlength

Cell Volume [ $\mu\text{l}$ ]	Pathlength [mm]	Sensitivity [AU]	Resolution (1st + 2nd peak)	N/m (5th peak)	Assymetry factor (5th Peak)
15	10	0.030	1.3	91 800	2.9
9	6	0.023	1.4	116 700	2.5
5	6	0.025	1.55	131 600	2.6
1.2	3	0.013	1.7	139 600	2.1
1.2*	4	0.016	2.6	118 800	1.1
0.009*	8	0.008	3.3	164 500	1.2

Stationary phase: GROM-SIL 100 ODS-2 FE; Column: 33 x 2.0 mm; Linear velocity 0.8 mm/s; Eluent: ACN:H<sub>2</sub>O = 65:35; each flow cell connected via quick-connector (100 x 0.1 mm stainless steel capillary), \* except capillary flowcells (150 mm x 100  $\mu\text{m}$  „fused-silica“-capillaries); Injection: 1  $\mu\text{l}$  benzoate test sample (dil. 1:100)

**Note!** experiments always have to be done at optimal linear velocity

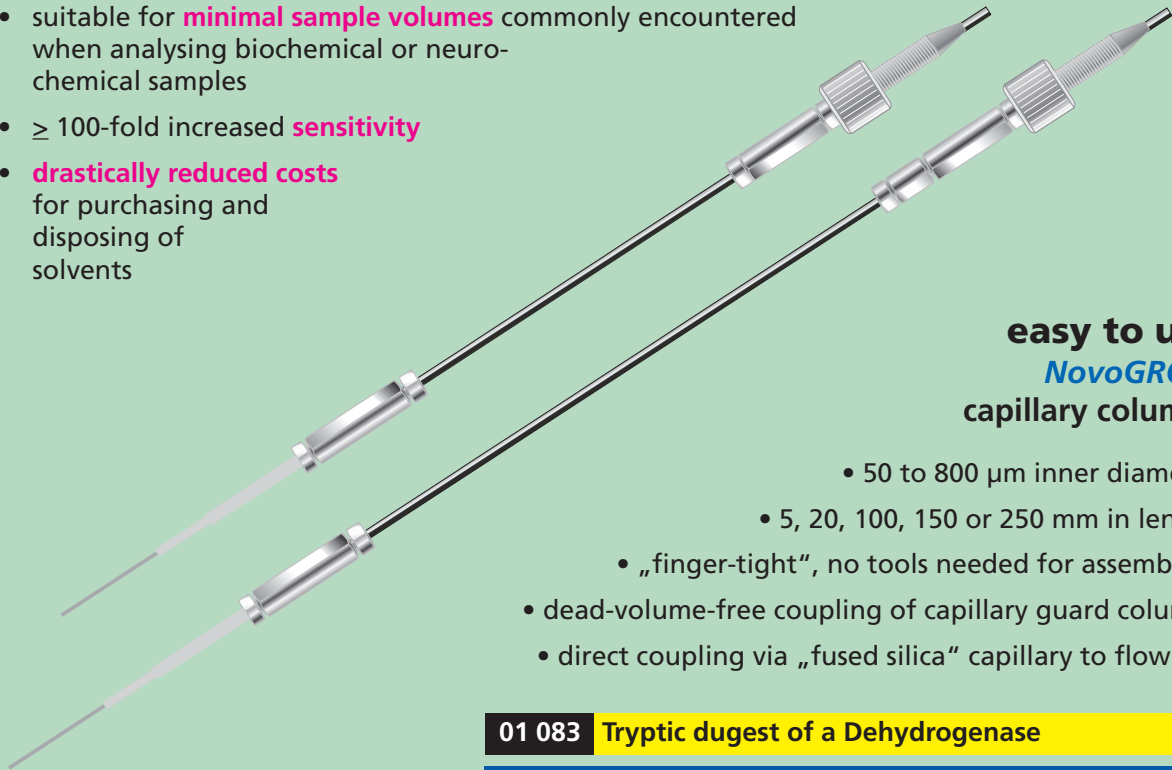


\* High speed liquid chromatography (HSLC)

# Don't be afraid of **Capillary-HPLC**

There is no sound reason for not taking advantage of the unique benefits of this exciting technique:

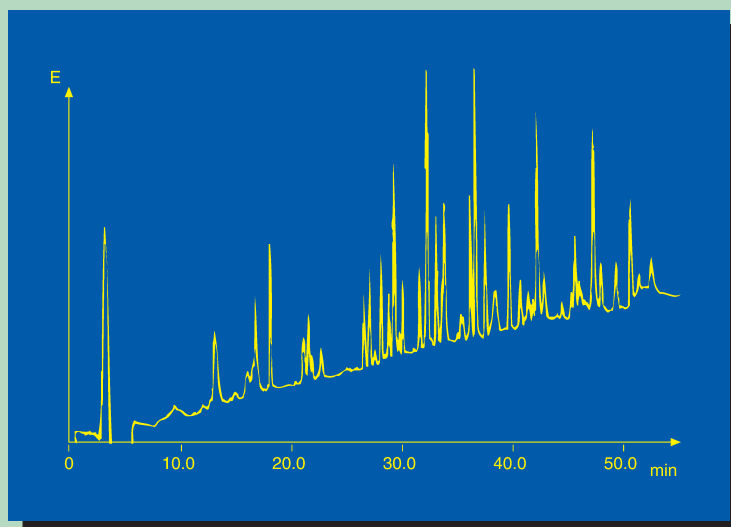
- convenient „on-line“ coupling to mass spectrometer
- suitable for **minimal sample volumes** commonly encountered when analysing biochemical or neurochemical samples
- $\geq 100$ -fold increased **sensitivity**
- **drastically reduced costs** for purchasing and disposing of solvents



**easy to use**  
**NovoGROM**  
capillary columns

- 50 to 800  $\mu\text{m}$  inner diameter
- 5, 20, 100, 150 or 250 mm in length
- „finger-tight“, no tools needed for assembling
- dead-volume-free coupling of capillary guard columns
- direct coupling via „fused silica“ capillary to flow cell

## 01 083 Tryptic digest of a Dehydrogenase



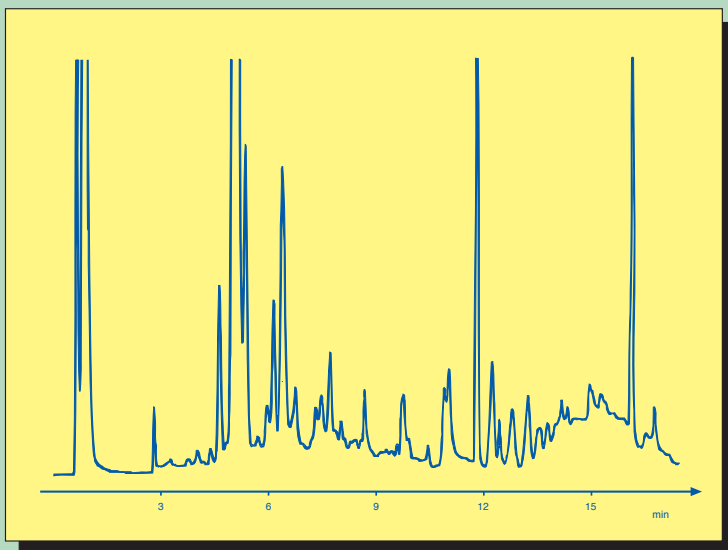
**Column phase:** GROM-SIL 100 ODS-2 FE,  
5  $\mu\text{m}$   
**Column size:** 250 mm x 300  $\mu\text{m}$   
**Eluent:** A: 0.1% TFA in  $\text{H}_2\text{O}$   
B: 0.1% TFA in ACN  
**Gradient:** 10–60% B (0–90 min)  
**Flow rate:** 5  $\mu\text{l}/\text{min}$   
**Pressure:** 16–7 MPa  
**Temperature:** RT  
**Detection (UV):** 214 nm  
**Sample:** 1  $\mu\text{l}$  (2 pMol)

**Note!** Any modern HPLC system may easily be converted to a capillary HPLC by means of a splitter, microinjector (only needed when working in isocratic mode) and capillary detector cell.

**NovoGROM** capillary columns (for further information see pages 12/13 and 144) can be packed with any of the stationary phases listed or with the customer's stationary phase.

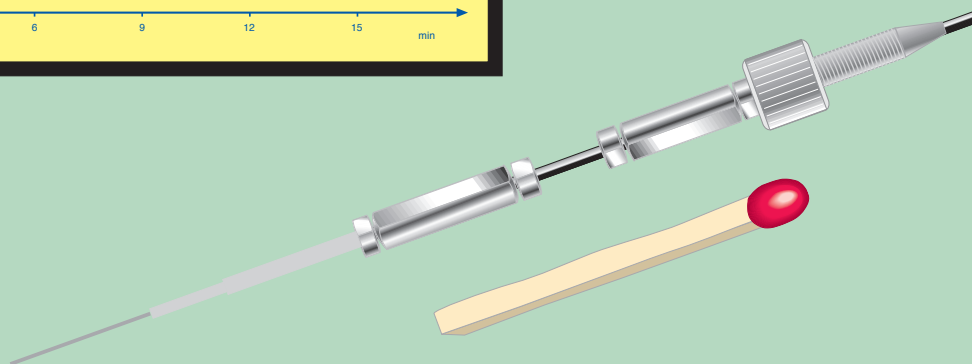
# Capillary High Speed Liquid Chromatography

33 mm x 300 µm capillary column, 1.5 µm packing material



## 10 184 Control of peptide synthesis

**Column phase:** GROM-SIL 100 ODS-2 FE, 1.5 µm  
**Column size:** 33mm x 300 µm  
**Eluent:** A: H<sub>2</sub>O, 0.1% TFA  
           B: Acetonitrile, 0.1% TFA  
**Gradient:** 5–60% B (0–15 min)  
**Flow rate:** 6 µl/min  
**Temperature:** RT  
**Detection (UV):** 214 nm  
**Sample:** 60 nl



## Typical computer printout of column test protocol

**PACKING MATERIAL**  
 GROM-SIL 100 ODS-2 FE  
**PARTICLE SIZE** 1.5 µm  
**COLUMN DIMENSIONS**  
 33 mm x 300 µm ID  
**PART NO.** GSQD20210C0430  
**SERIAL NO.** 290995 1

**TEST CONDITIONS**  
**MOBILE PHASE**  
 CH<sub>3</sub>CN:H<sub>2</sub>O 70:30  
**FLOW RATE** 5 µL/min  
**PRESSURE** 5 MPa  
**DETECTION:** UV 254 nm



PEAK NO.	RETENTION TIME (MIN)	SOLUTES	ASYMMETRY FACTOR	THEORETICAL PLATES/COL	THEORETICAL PLATES/M
1	1.38	METHYLBENZOATE	1.2	3307	100221
2	1.65	ETHYLBENZOATE	1.2	3803	115236
3	2.07	PROPYLBENZOATE	1.4	4985	151072
4	2.71	BUTYLBENZOATE	1.3	5787	175371
5	3.71	PENTYLBENZOATE	1.3	7181	217592

## On-line Coupling of **Capillary HPLC** and **with Coordination Ion Spray** Separation and Detection of **Unsat**

Electrospray mass spectrometry (ES-MS) especially in combination with capillary HPLC (CHPLC) and capillary electrochromatography (CEC) is one of the most powerful techniques for the structural elucidation of polar biopolymers (see also page 85).

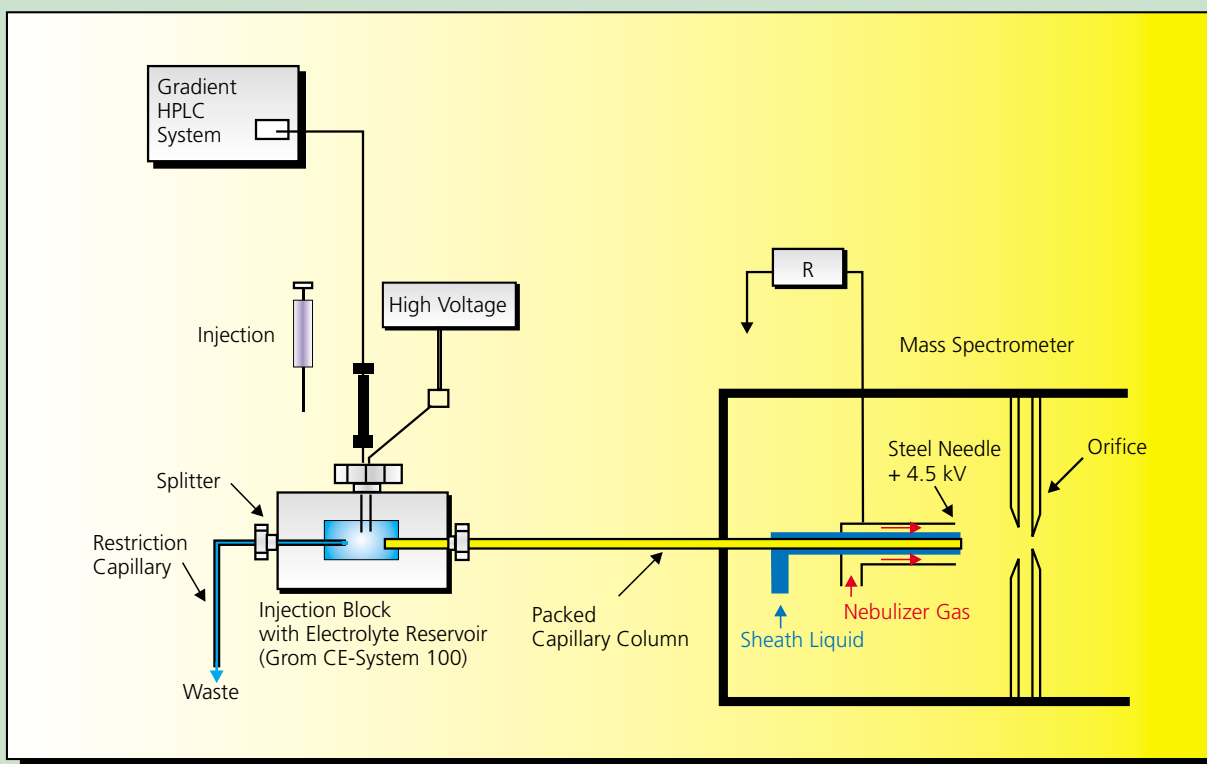
Unfortunately electrospray ionisation so far is not applicable to non-polar substances and of limited significance for weakly polar substances. Recently a new ionization method adding (by sheath flow technique) a solution of a central ion capable of forming charged coordination compounds has been developed [1, 2].

For the hyphenation of CHPLC and CEC to coordination ion spray mass spectrometry (CIS-MS) the coaxial sheath flow interface described by Smith et al. [3] for capillary zone electrophoresis mass spectrometry (CZE-MS) coupling

was used [3]. Figure 1 shows a schematic drawing of the setup for CEC- and CHPLC-CIS-MS coupling. In this arrangement a concentric series of capillaries is used in which the central CEC/CHPLC column (100  $\mu\text{m}$  i.d., 164  $\mu\text{m}$  o.d.; length 25 cm) is surrounded by a stainless steel needle and the latter by the nebulizer gas.

The coordination ion solution is introduced in the interspace between steel needle and separation column by a syringe pump at a flow rate of 3  $\mu\text{l}/\text{min}$ . Thereby the coordination ion solution is acting as complexing reagent providing ionization as well as sheath flow ensuring stable spray conditions.

It is well known from coordination chemistry that silver ions have a high affinity for olefinic compounds. This affinity was utilized for the detection of unsaturated



fatty acid methyl esters (UFAMEs) by using an aqueous sheath flow containing  $\text{AgNO}_3$ . Figure 2 shows the comparative separations of four UFAMEs with CEC, pressurized with CEC,

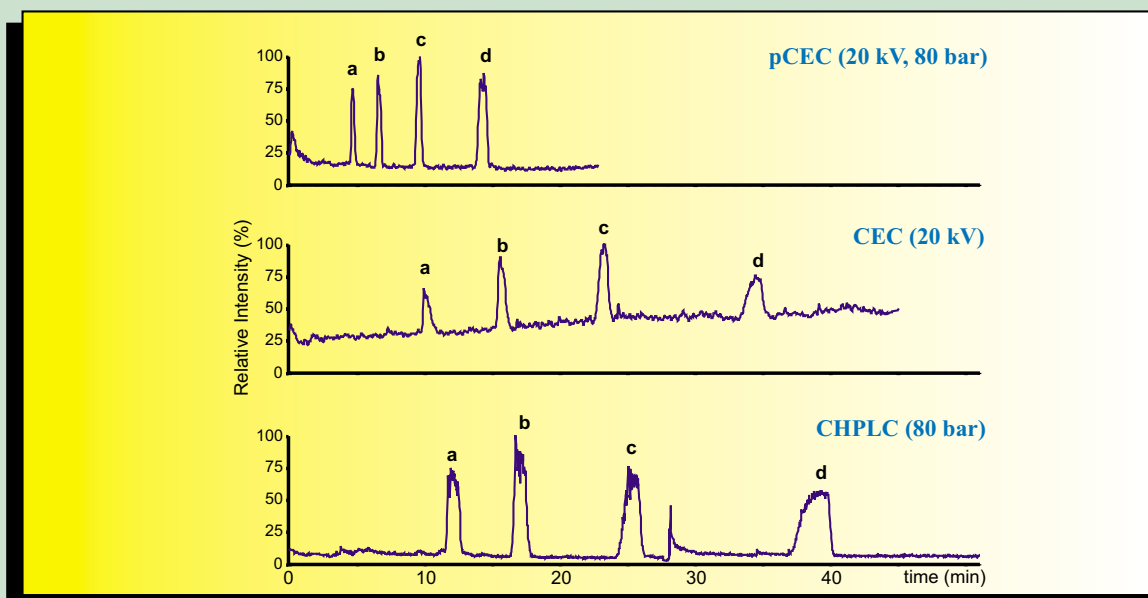
pressurized CEC (pCEC) and CHPLC with CIS-MS for detection. The reduction of analysis time is relatively small by changing from CHPLC to CEC (10 %). The combination of pressure and

# Capillary Electrochromatography Mass Spectrometry (CIS-MS)

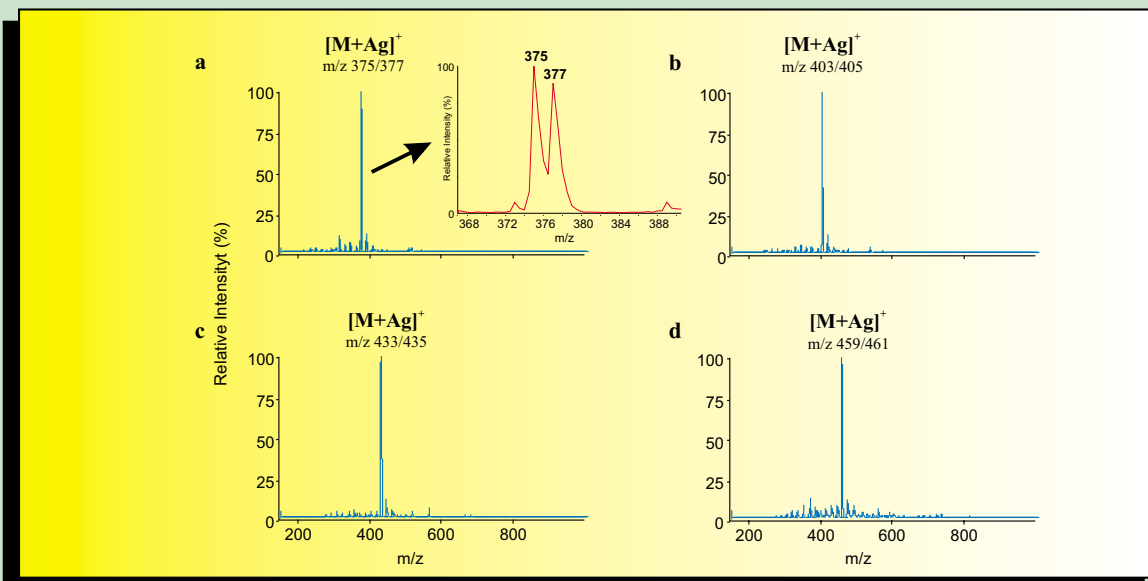
## urated Fatty Acid Methyl Esters (UFAMEs)

electroosmotic flow (EOF) in pressure CEC (pCEC) however decreases the analysis time by

about 60 % and narrows the peaks drastically.



**Figure 2:** Separation of the methyl esters of (a) palmitoleic acid, (b) oleic acid, (c) eicosenoic acid and (d) erucic acid. Column: 100  $\mu\text{m}$  i.d., 164  $\mu\text{m}$  o.d., length 25 cm, packed with GROM-SIL ODS 0-AB, 100  $\text{\AA}$ , 3  $\mu\text{m}$ . Eluent: 40 mM  $\text{NH}_4\text{AC}$ , pH 9 / ACN = 5 / 95. Sheath liquid: 100  $\mu\text{g}/\text{ml}$   $\text{AgNO}_3$ .



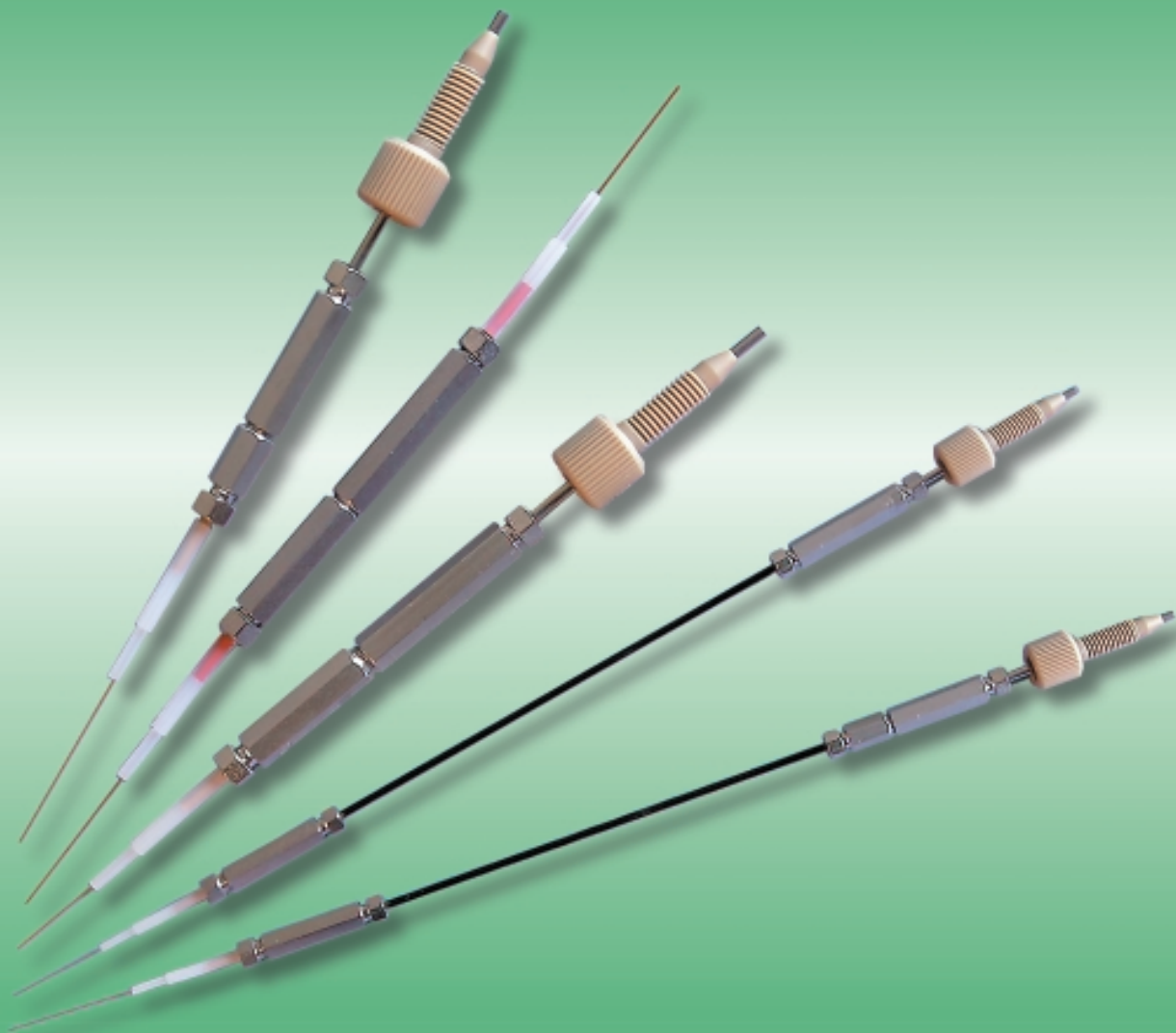
**Figure 3:** Shows the mass spectra taken from the peaks in figure 2. The  $\text{Ag}^+$  complexes are readily recognized on account of the characteristic abundance ratio of silver isotopes ( $^{107}\text{Ag} / ^{109}\text{Ag} = 51.8 / 48.2$ ). Therefore the magnification shows a double peak for the  $[\text{M}+\text{Ag}]^+$  ions.

[1] E. Bayer, P. Gfrörer, C. Rentel, *Angew. Chem. Int. Ed.* 38, 992-995 (1999).

[2] C. P. Gfrörer, E. Bayer, C. Rentel, *Electrophoresis* 20, 2329-2336 (1999).

[3] R. D. Smith, C. J. Barinaga, H. R. Udseth, *Anal. Chem.* 60, 1948-1952 (1988).

**NovoGROM Nano-LC COLUMNS - 25 to 100  $\mu\text{m}$  i.d. -**  
**NovoGROM CAPILLARY COLUMNS - 180 to 800  $\mu\text{m}$  i.d. -**



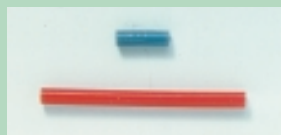
In addition to the on-line coupling with a mass spectrometer, the driving force behind the continuous development of microbore- and capillary chromatography has come in particular from the fields of physiological chemistry and neurochemistry, where the volumes of sample available are often extremely low ( $\mu\text{l}$  or even  $\text{nI}$ ), thus requiring maximum sensitivity. Both the reduced running costs and the environmental benefits arising from the drastically reduced consumption of solvents are further significant advantages gained by the miniaturisation of HPLC.

**GROM** offers a full range of columns and accessories for capillary HPLC for those interested in taking advantage of the most modern developments in HPLC. Similar to the proven analytical **NovoGROM** cartridge system, the integrated guard columns are sealed manually without tools („finger-tight“).

According to the customer's requirements these columns can be supplied packed with any stationary phase listed in this catalogue.

## Capillary guard columns, packed\*

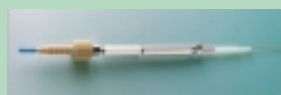
**NovoGROM**-capillary guard columns for dead-volume-free, finger-tight connection to capillary columns, may be used as enrichment columns or short analytical columns, in addition to the normal use as protective guard columns.



### Order number Description\*\*

*** .....C0030	<b>Capillary guard column</b> - 5 mm x 300 µm -
*** .....C0130	<b>Capillary guard column</b> - 10 mm x 300 µm -
*** .....C0230	<b>Capillary guard column</b> - 20 mm x 300 µm -
*** .....C0050	<b>Capillary guard column</b> - 5 mm x 500 µm -
*** .....C0150	<b>Capillary guard column</b> - 10 mm x 500 µm -
*** .....C0250	<b>Capillary guard column</b> - 20 mm x 500 µm -

### Capillary guard column holders (for 5 mm and 20 mm guard columns)



3705A	<b>Guard column holder „5“</b> for 5 mm capillary guard columns
3710A	<b>Guard column holder „10“</b> for 10 mm capillary guard columns
3720A	<b>Guard column holder „20“</b> for 20 mm capillary guard columns

3705B	<b>Guard column holder „5“</b> for 5 mm capillary guard columns
3710B	<b>Guard column holder „10“</b> for 10 mm capillary guard columns
3720B	<b>Guard column holder „20“</b> for 20 mm capillary guard columns

## Standard capillary columns, packed\*

Quartz glass **NovoGROM** capillary columns are connected directly (ie., without dead volume) to the microinjector and via „fused silica“ capillary to the capillary HPLC detector cell or to the MS-Interface.



*** .....C0508	<b>Capillary column</b> - 50 mm x 75 µm -
*** .....C0808	<b>Capillary column</b> - 75 mm x 75 µm -
*** .....C1008	<b>Capillary column</b> - 100 mm x 75 µm -
*** .....C1508	<b>Capillary column</b> - 150 mm x 75 µm -
*** .....C2508	<b>Capillary column</b> - 250 mm x 75 µm -
*** .....C0510	<b>Capillary column</b> - 50 mm x 100 µm -
*** .....C0810	<b>Capillary column</b> - 75 mm x 100 µm -
*** .....C1010	<b>Capillary column</b> - 100 mm x 100 µm -
*** .....C1510	<b>Capillary column</b> - 150 mm x 100 µm -
*** .....C2510	<b>Capillary column</b> - 250 mm x 100 µm -
*** .....C0520	<b>Capillary column</b> - 50 mm x 200 µm -
*** .....C0820	<b>Capillary column</b> - 75 mm x 200 µm -
*** .....C1020	<b>Capillary column</b> - 100 mm x 200 µm -
*** .....C1520	<b>Capillary column</b> - 150 mm x 200 µm -
*** .....C2520	<b>Capillary column</b> - 250 mm x 200 µm -



*** .....C0530	<b>Capillary column</b> - 50 mm x 300 µm -
*** .....C0830	<b>Capillary column</b> - 75 mm x 300 µm -
*** .....C1030	<b>Capillary column</b> - 100 mm x 300 µm -
*** .....C1530	<b>Capillary column</b> - 150 mm x 300 µm -
*** .....C2530	<b>Capillary column</b> - 250 mm x 300 µm -
*** .....C0550	<b>Capillary column</b> - 50 mm x 500 µm -
*** .....C0850	<b>Capillary column</b> - 75 mm x 500 µm -
*** .....C1050	<b>Capillary column</b> - 100 mm x 500 µm -
*** .....C1550	<b>Capillary column</b> - 150 mm x 500 µm -
*** .....C2550	<b>Capillary column</b> - 250 mm x 500 µm -
*** .....C0580	<b>Capillary column</b> - 50 mm x 800 µm -
*** .....C0880	<b>Capillary column</b> - 75 mm x 800 µm -
*** .....C1080	<b>Capillary column</b> - 100 mm x 800 µm -
*** .....C1580	<b>Capillary column</b> - 150 mm x 800 µm -
*** .....C2580	<b>Capillary column</b> - 250 mm x 800 µm -

\* **NovoGROM** capillary columns can be packed with any of the stationary phases listed in this catalogue or with the customer's stationary phase.

\*\* Other dimensions upon request.

\*\*\* To complete the order number, add here the abbreviation for the desired stationary phase (see HPLC catalogue pages 160-161).

## Capillary columns with guard column head and 5 mm guard column, packed\*

**NovoGROM** capillary guard columns are connected directly without dead volume to the **NovoGROM** capillary columns by means of the column head.



### Order number Description \*\*

***.....C0530T	<b>Capillary column</b> - 50 mm x 300 µm - with 5 mm x 300 µm guard column
***.....C0830T	<b>Capillary column</b> - 75 mm x 300 µm - with 5 mm x 300 µm guard column
***.....C1030T	<b>Capillary column</b> - 100 mm x 300 µm - with 5 mm x 300 µm guard column
***.....C1530T	<b>Capillary column</b> - 150 mm x 300 µm - with 5 mm x 300 µm guard column
***.....C2530T	<b>Capillary column</b> - 250 mm x 300 µm - with 5 mm x 300 µm guard column
***.....C0550T	<b>Capillary column</b> - 50 mm x 500 µm - with 5 mm x 500 µm guard column
***.....C0850T	<b>Capillary column</b> - 75 mm x 500 µm - with 5 mm x 500 µm guard column
***.....C1050T	<b>Capillary column</b> - 100 mm x 500 µm - with 5 mm x 500 µm guard column
***.....C1550T	<b>Capillary column</b> - 150 mm x 500 µm - with 5 mm x 500 µm guard column
***.....C2550T	<b>Capillary column</b> - 250 mm x 500 µm - with 5 mm x 500 µm guard column
***.....C0580T	<b>Capillary column</b> - 50 mm x 800 µm - with 5 mm x 800 µm guard column
***.....C0880T	<b>Capillary column</b> - 75 mm x 800 µm - with 5 mm x 800 µm guard column
***.....C1080T	<b>Capillary column</b> - 100 mm x 800 µm - with 5 mm x 800 µm guard column
***.....C1580T	<b>Capillary column</b> - 150 mm x 800 µm - with 5 mm x 800 µm guard column
***.....C2580T	<b>Capillary column</b> - 250 mm x 800 µm - with 5 mm x 800 µm guard column

## Capillary columns with 20 mm guard column, packed\*



***.....C0530L	<b>Capillary column</b> - 50 mm x 300 µm - with 20 mm x 300 µm guard column
***.....C0830L	<b>Capillary column</b> - 75 mm x 300 µm - with 20 mm x 300 µm guard column
***.....C1030L	<b>Capillary column</b> - 100 mm x 300 µm - with 20 mm x 300 µm guard column
***.....C1530L	<b>Capillary column</b> - 150 mm x 300 µm - with 20 mm x 300 µm guard column
***.....C2530L	<b>Capillary column</b> - 250 mm x 300 µm - with 20 mm x 300 µm guard column
***.....C0550L	<b>Capillary column</b> - 50 mm x 500 µm - with 20 mm x 500 µm guard column
***.....C0850L	<b>Capillary column</b> - 75 mm x 500 µm - with 20 mm x 500 µm guard column
***.....C1050L	<b>Capillary column</b> - 100 mm x 500 µm - with 20 mm x 500 µm guard column
***.....C1550L	<b>Capillary column</b> - 150 mm x 500 µm - with 20 mm x 500 µm guard column
***.....C2550L	<b>Capillary column</b> - 250 mm x 500 µm - with 20 mm x 500 µm guard column
***.....C0580L	<b>Capillary column</b> - 50 mm x 800 µm - with 20 mm x 800 µm guard column
***.....C0880L	<b>Capillary column</b> - 75 mm x 800 µm - with 20 mm x 800 µm guard column
***.....C1080L	<b>Capillary column</b> - 100 mm x 800 µm - with 20 mm x 800 µm guard column
***.....C1580L	<b>Capillary column</b> - 150 mm x 800 µm - with 20 mm x 800 µm guard column
***.....C2580L	<b>Capillary column</b> - 250 mm x 800 µm - with 20 mm x 800 µm guard column

\* **NovoGROM**-capillary columns can be packed with any of the stationary phases listed in this catalogue or with the customer's stationary phase.

\*\* Other dimensions upon request.

\*\*\* To complete the order number, add here the abbreviation for the desired stationary phase (see HPLC catalogue pages 160-161).

## Accessories for capillary columns

**NovoGROM** Nano-LC- and capillary columns can easily be operated either with any commonly available, modern HPLC system using a capillary splitter and capillary detector cell or preferably with an advanced mikro-HPLC system.

	Order number	Description
	6909	<b>Capillary detector cell assembly</b> (4 nl / 0.2 mm) for „Linear“, „Spectra-Physics“, ThermoQuest or „Thermo Separation Products“ UV-detectors, complete, with 50 µm i.d., resp. 280 or 365 µm o.d. capillary connections
	6910	<b>Capillary detector cell assembly</b> (15 nl / 0.3 mm), same as 6909, complete, but with 75 µm i.d., resp. 280 or 365 µm o.d. capillary connections
	6911	<b>Capillary detector cell assembly</b> (35 nl / 0.4 mm), same as 6909, complete, but with 100 µm i.d., resp. 280 or 365 µm o.d. capillary connections
	6912	<b>Spare cell</b> (15 nl / 0.3 mm) for 6910
	6913	<b>Spare cell</b> (35 nl / 0.4 mm) for 6911
	6914	<b>Spare cell</b> (4 nl / 0.2 mm) for 6909
	6906	<b>Microinjector</b> - injection volume 60 nl
	6920	<b>Microinjector</b> - injection volume 200 nl
	6907	<b>Spare rotor</b> for 60 nl microinjector
	6921	<b>Spare rotor</b> for 200 nl microinjector
	6905	<b>Splitting device</b> for capillary HPLC with 3 exchangeable fused silica restrictor capillaries of different lengths
	6904	<b>Tungsten carbide glass knife</b> for cutting fused silica capillaries, etc.
	6908	<b>PROCUT</b> for fused silica capillaries
	6915	<b>Finger-tight fitting with PEEK sleeve insert</b> (natural) for 280 µm o.d. fused silica capillaries
	6916	<b>Finger-tight fitting with PEEK sleeve insert</b> (red) for 365 µm o.d. fused silica capillaries
	6917	<b>Ferrule</b> for 190 µm o.d. fused silica capillary (Pk. of 4)
	6919	<b>Microsyringe</b> (10 µl) for flow control with coupling


**Order number Description**

6925 **Clean-up guard column set**, complete



6930 **Capillary connector** plus adjustment screw for coupling two fused silica capillaries, sleeves not included



6932 **Micro-finger-tight** for coupling fused silica capillaries using 6930 (Pk. of 2)



6933 **Micro-adjustment screw** for fused silica capillaries in 6930 (Pk. of 2)



6935 **Capillary connector** for coupling 1/16" capillary with fused silica capillary, no sleeve included



6937 **Finger-tight fitting** for coupling 1/16" capillary using 6935 (Pk. of 2)



6938 **Adjustment screw** for fused silica capillary in 6935 (Pk. of 2)

6950 **Micro-tubing** (red) for connecting 127  $\mu\text{m}$  o.d. fused silica capillaries (Pk. of 10)

6951 **Micro-tubing** (yellow) for connecting 178  $\mu\text{m}$  o.d. fused silica capillaries (Pk. of 10)



6952 **Micro-tubing** (natural) for connecting 229  $\mu\text{m}$  o.d. fused silica capillaries (Pk. of 10)

6953 **Micro-tubing** (blue) for connecting 280  $\mu\text{m}$  o.d. fused silica capillaries (Pk. of 10)

6954 **Micro-tubing** (orange) for connecting 330  $\mu\text{m}$  o.d. fused silica capillaries (Pk. of 10)



6955 **Micro-tubing** (green) for connecting 380  $\mu\text{m}$  o.d. fused silica capillaries (Pk. of 10)

6956 **Micro-tubing** (black) for connecting 457  $\mu\text{m}$  o.d. fused silica capillaries (Pk. of 10)

6957 **Micro-tubing** (natural) for connecting 533  $\mu\text{m}$  o.d. fused silica capillaries (Pk. of 10)

6960 **Micro-tubing kit** for connecting various fused silica capillaries (including 6950–6957)

6961 **1/16" Tubing** (red) for connecting 365  $\mu\text{m}$  o.d. fused silica capillaries (Pk. of 10)



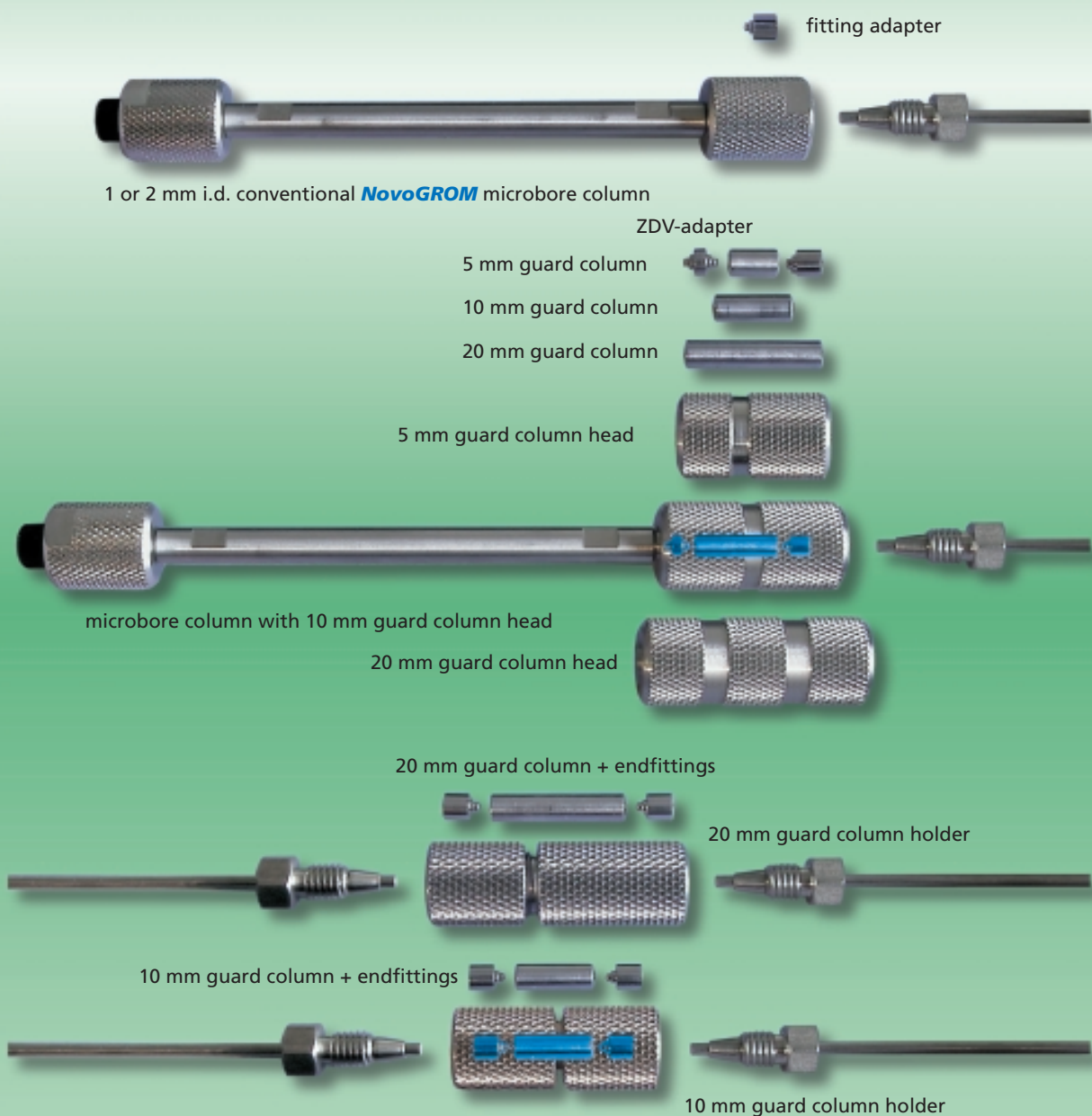
9701 **High pressure „in-line“ filter**

## NovoGROM Microbore Columns – 1 and 2 mm i.d. –

Many of the modern biochemical applications requiring micro-column HPLC may be conveniently solved by the employment of **NovoGROM microbore columns**. With 2 or 1 mm i.d. columns, a 4-fold or 16-fold increase in sensitivity, respectively, is obtained relative to conventional 4 mm i.d. columns. At the same time, the solvent consumption at constant linear flow-rate decreases by 75% or 93% respectively. The requirements for microbore HPLC (in particular constant flow at low volumetric flow-rates) are fulfilled by all modern HPLC systems, so that customers can take advantage of this modern form of HPLC simply by the use of **NovoGROM microbore columns**.

According to customers requirements, **NovoGROM microbore** columns can be supplied packed with any of the stationary phases described in this catalogue, or can be packed by the **GROM column-filling-service** with any other (eg., customer's own) stationary phase.

### Conventional, ferrule-type fitting



All **NovoGROM microbore columns** are available in four versions:

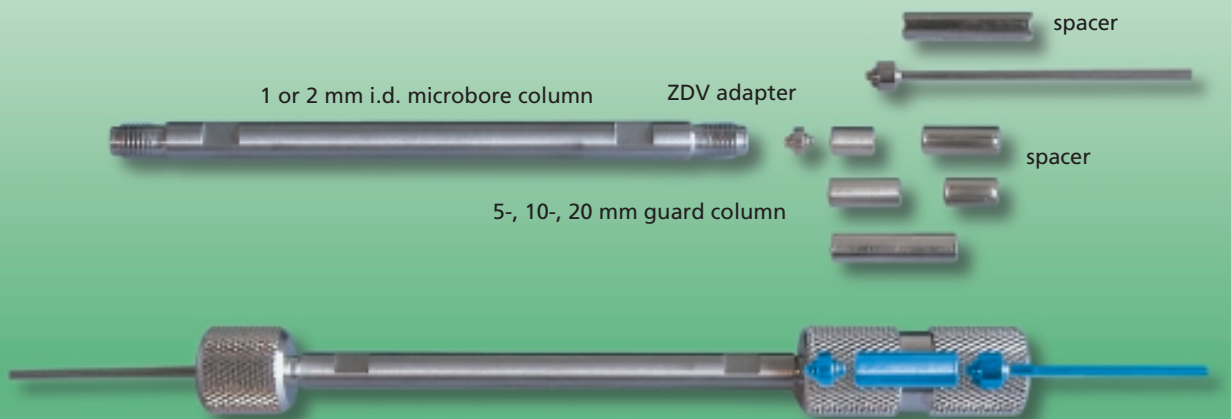
- as packed columns, complete with column head and fitting adaptors.
- as packed cartridges, with sealing gaskets and sieves, but sealed with screw caps.
- as empty columns, complete with column heads and fitting adaptors.
- as empty cartridges with sealing gaskets, sieves and sealing screw caps.

The **NovoGROM microbore system** is distinguished by its simple manual handling (quickly connected without tools - finger-tight) and the flexibility and variability of its usage.

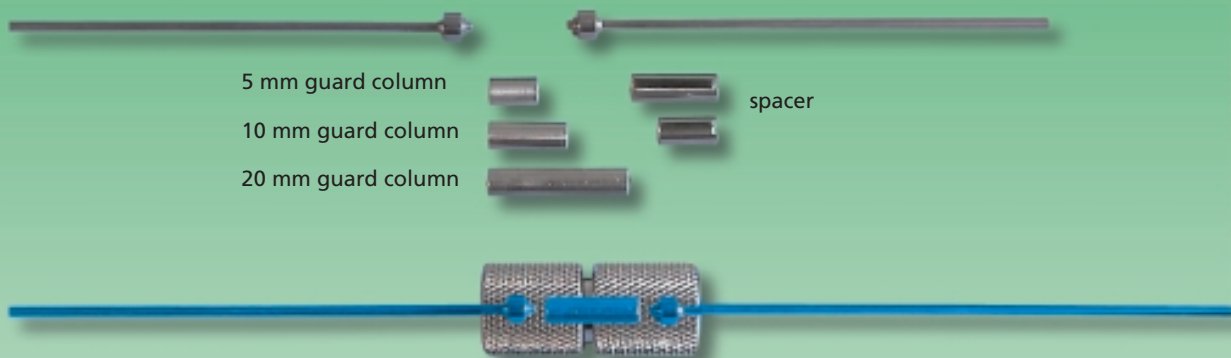
### Modern, advanced low-dispersion quick connector fitting



**NovoGROM** microbore column with quick connectors, assembled



low-dispersion microbore column with integrated 10 mm guard column

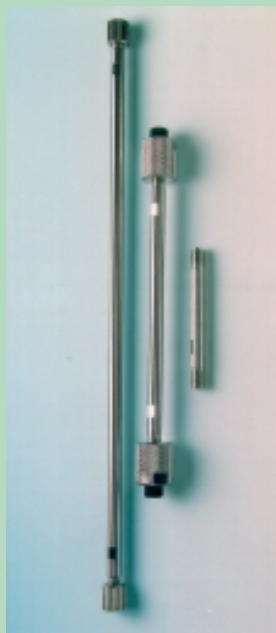


guard column holder with 10 mm guard column

## Microbore HPLC columns, packed\*



Order number	Description**
***... V0001V	<b>Guard columns-MICRO</b> - 5 x 1 mm - (Pk. of 5)
***... V0101V	<b>Guard columns-MICRO</b> - 10 x 1 mm - (Pk. of 5)
***... V0201V	<b>Guard columns-MICRO</b> - 20 x 1 mm - (Pk. of 5)
***... V0002V	<b>Guard columns-MICRO</b> - 5 x 2 mm - (Pk. of 5)
***... V0102V	<b>Guard columns-MICRO</b> - 10 x 2 mm - (Pk. of 5)
***... V0202V	<b>Guard columns-MICRO</b> - 20 x 2 mm - (Pk. of 5)



***... S0201, resp. *... K0201	<b>Column (S) or cartridge (K)-MICRO</b> 20 mm x 1 mm
***... S0301, resp. *... K0301	<b>Column (S) or cartridge (K)-MICRO</b> 30 mm x 1 mm
***... S0401, resp. *... K0401	<b>Column (S) or cartridge (K)-MICRO</b> 40 mm x 1 mm
***... S0501, resp. *... K0501	<b>Column (S) or cartridge (K)-MICRO</b> 50 mm x 1 mm
***... S0601, resp. *... K0601	<b>Column (S) or cartridge (K)-MICRO</b> 60 mm x 1 mm
***... S0801, resp. *... K0801	<b>Column (S) or cartridge (K)-MICRO</b> 75 mm x 1 mm
***... S1001, resp. *... K1001	<b>Column (S) or cartridge (K)-MICRO</b> 100 mm x 1 mm
***... S1201, resp. *... K1201	<b>Column (S) or cartridge (K)-MICRO</b> 125 mm x 1 mm
***... S1501, resp. *... K1501	<b>Column (S) or cartridge (K)-MICRO</b> 150 mm x 1 mm
***... S2001, resp. *... K2001	<b>Column (S) or cartridge (K)-MICRO</b> 200 mm x 1 mm
***... S2501, resp. *... K2501	<b>Column (S) or cartridge (K)-MICRO</b> 250 mm x 1 mm
***... S3001, resp. *... K3001	<b>Column (S) or cartridge (K)-MICRO</b> 300 mm x 1 mm
***... S0202, resp. *... K0202	<b>Column (S) or cartridge (K)-MICRO</b> 20 mm x 2 mm
***... S0302, resp. *... K0302	<b>Column (S) or cartridge (K)-MICRO</b> 30 mm x 2 mm
***... S0402, resp. *... K0402	<b>Column (S) or cartridge (K)-MICRO</b> 40 mm x 2 mm
***... S0502, resp. *... K0502	<b>Column (S) or cartridge (K)-MICRO</b> 50 mm x 2 mm
***... S0602, resp. *... K0602	<b>Column (S) or cartridge (K)-MICRO</b> 60 mm x 2 mm
***... S0802, resp. *... K0802	<b>Column (S) or cartridge (K)-MICRO</b> 75 mm x 2 mm
***... S1002, resp. *... K1002	<b>Column (S) or cartridge (K)-MICRO</b> 100 mm x 2 mm
***... S1202, resp. *... K1202	<b>Column (S) or cartridge (K)-MICRO</b> 125 mm x 2 mm
***... S1502, resp. *... K1502	<b>Column (S) or cartridge (K)-MICRO</b> 150 mm x 2 mm
***... S2002, resp. *... K2002	<b>Column (S) or cartridge (K)-MICRO</b> 200 mm x 2 mm
***... S2502, resp. *... K2502	<b>Column (S) or cartridge (K)-MICRO</b> 250 mm x 2 mm
***... S3002, resp. *... K3002	<b>Column (S) or cartridge (K)-MICRO</b> 300 mm x 2 mm



***... P0302	<b>Column-MICRO, PEEK, 30 mm x 2 mm</b>
***... P0502	<b>Column-MICRO, PEEK, 50 mm x 2 mm</b>
***... P1002	<b>Column-MICRO, PEEK, 100 mm x 2 mm</b>
***... P1502	<b>Column-MICRO, PEEK, 150 mm x 2 mm</b>
***... P2502	<b>Column-MICRO, PEEK, 250 mm x 2 mm</b>
***... P3002	<b>Column-MICRO, PEEK, 300 mm x 2 mm</b>



1500 Set of **Quick connectors-MICRO**, for rapid, manual connection of micro cartridges - pressure resistant to 40 MPa - complete with two 100 mm x 0.12 mm i.d. capillaries with fitting adapters

1550 Set of **Quick connectors-MICRO** same as 1500, but with 50 mm x 0.12 mm i.d. capillaries with fitting adapters



2500 **Guard column holder-MICRO** - fingertight - for 5, 10 and 20 mm MICRO guard columns - pressure resistant to 40 MPa - complete, consisting of two capillaries with fitting adapters (100 mm x 0.12 mm i.d.) and two spacers for 5 and 10 mm guard columns

2550 **Guard column holder-MICRO**, same as 2500, but with 50 mm x 0.12 mm i.d. capillaries with fitting adapters

\* **NovoGROM** microbore HPLC columns can be packed with any of the stationary phases listed in this catalogue or with the customer's stationary phase.

\*\* Other dimensions upon request.

\*\*\* To complete the order number, add here the abbreviation for the desired stationary phase (see HPLC catalogue pages 160-161).

Order number	Description
2551	<b>Guard column holder-MICRO</b> for 10 mm guard column, same as 2500, but for conventional fittings
2555	<b>Guard column holder-MICRO</b> for 20 mm guard column, same as 2500, but for conventional fittings
2600	<b>Guard column holder-MICRO</b> , same as 2500, but in addition supplied with two fitting adapters
3500	<b>Guard column head-MICRO</b> , for dead volume free coupling of <b>NovoGROM</b> -Microbore columns with 5, 10 and 20 mm MICRO guard columns - pressure resistant to 40 MPa - consisting of capillary with fitting adapter (100 mm x 0.12 mm i.d.), ZDV adapter and three spacers for 5 and 10 mm guard columns or for use without guard column
3550	<b>Guard column head-MICRO</b> , same as 3500, but with 50 mm x 0.12 mm i.d. capillary with fitting adapter
3551	<b>Guard column head-MICRO</b> for conventional fitting of 5 mm guard column, but without capillary
3552	<b>Guard column head-MICRO</b> for conventional fitting of 10 mm guard column, but without capillary
3555	<b>Guard column head-MICRO</b> for conventional fitting of 20 mm guard column, but without capillary
4500	<b>Guard column combination-MICRO</b> , for dead volume free coupling of <b>NovoGROM</b> - Microbore columns with 5, 10 and 20 mm MICRO guard columns - pressure resistant to 40 MPa - consisting of two capillaries with fitting adapter (100 mm x 0.12 mm), one MICRO quick connector and one MICRO guard column head, ZDV adapter and three spacers for 5 and 10 mm guard columns or for use without guard column
4550	<b>Guard column combination-MICRO</b> , same as 4500, but with 50 mm x 0.12 mm i.d. capillaries with fitting adapter
6501	<b>Connector</b> for direct coupling of two MICRO-columns
6502	<b>Quick-connector head-MICRO</b> (cap nut)
6510	<b>Spanner</b> (wrench) <b>SW 5</b> , for tightening MICRO columns
6511	<b>Spacer</b> for 5 mm MICRO guard columns (length 15 mm)



**Order number**   **Description**  
 6512            **Spacer** for 10 mm MICRO guard columns (length 10 mm)



6513            **Spacer** for operation without guard column (length 25 mm)



6519            **Zero Dead Volume (ZDV) adapter-MICRO** for coupling of two columns



6520            **Accessory set** for guard columns (composed of order numbers 6511, 6512, 6513 and 6519)



6521            **PTFE sealing gaskets-MICRO** for microbore columns (Pk. of 40)

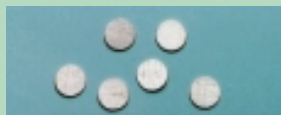
6522            **PTFE sealing gaskets-MICRO** for microbore columns (Pk. of 100)



6523P           **PTFE sealing gaskets-MICRO** for SFC (Pk. of 5)



6530            **Sieve kit MICRO** (12 sieves, 6 PTFE gaskets)



6540            **Stainless steel sieves MICRO** (2 µm) for microbore columns (Pk. of 20)

6541            **Stainless steel sieves MICRO** (2 µm) for microbore columns (Pk. of 100)



6542            **Steel stopper** (cap) for microbore cartridges



6543            **Stopper** (plug) for microbore guard columns (Pk. of 10)



6544            **PE stopper** (cap) for microbore cartridges (Pk. of 10)

## Order number Description



6570 **Double fitting adapter** (for coupling two MICRO-cartridges)



6571 **Cap nut**, slotted (for order no. 6570)



6582 **Column head MICRO** employing conventional fitting



6583 **Stainless steel fitting adapter** employing conventional fitting with column head MICRO



6591 **PEEK frit**, with ring, for 1- and 2 mm i. d. microbore column

6550 **Stainless steel capillary**, 50 mm x 0.12 mm i.d., with fitting adapter-MICRO (1 piece)

6551 **Stainless steel capillary**, 100 mm x 0.12 mm i.d., with fitting adapter-MICRO (1 piece)

6552 **Stainless steel capillary**, 250 mm x 0.12 mm i.d., with fitting adapter-MICRO (1 piece)

6553 **Stainless steel capillary**, 300 mm x 0.12 mm i.d., with fitting adapter-MICRO (1 piece)

6555 **Stainless steel capillary**, 500 mm x 0.12 mm i.d., with fitting adapter-MICRO (1 piece)

6557 **Stainless steel capillary**, 700 mm x 0.12 mm i.d., with fitting adapter-MICRO (1 piece)

6558 **Stainless steel capillary**, 800 mm x 0.12 mm i.d., with fitting adapter-MICRO (1 piece)

6560 **Stainless steel capillary**, 50 mm x 0.25 mm i.d., with fitting adapter-MICRO (1 piece)

6561 **Stainless steel capillary**, 100 mm x 0.25 mm i.d., with fitting adapter-MICRO (1 piece)

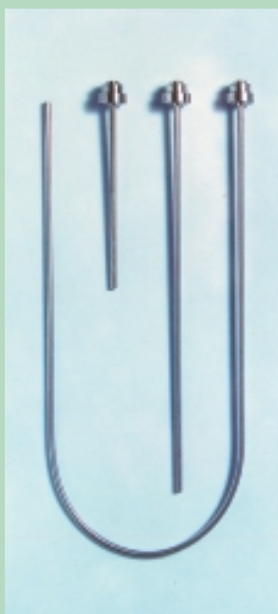
6562 **Stainless steel capillary**, 250 mm x 0.25 mm i.d., with fitting adapter-MICRO (1 piece)

6563 **Stainless steel capillary**, 300 mm x 0.25 mm i.d., with fitting adapter-MICRO (1 piece)

6564 **Stainless steel capillary**, 500 mm x 0.25 mm i.d., with fitting adapter-MICRO (1 piece)

6567 **Stainless steel capillary**, 700 mm x 0.25 mm i.d., with fitting adapter-MICRO (1 piece)

6568 **Stainless steel capillary**, 800 mm x 0.25 mm i.d., with fitting adapter-MICRO (1 piece)



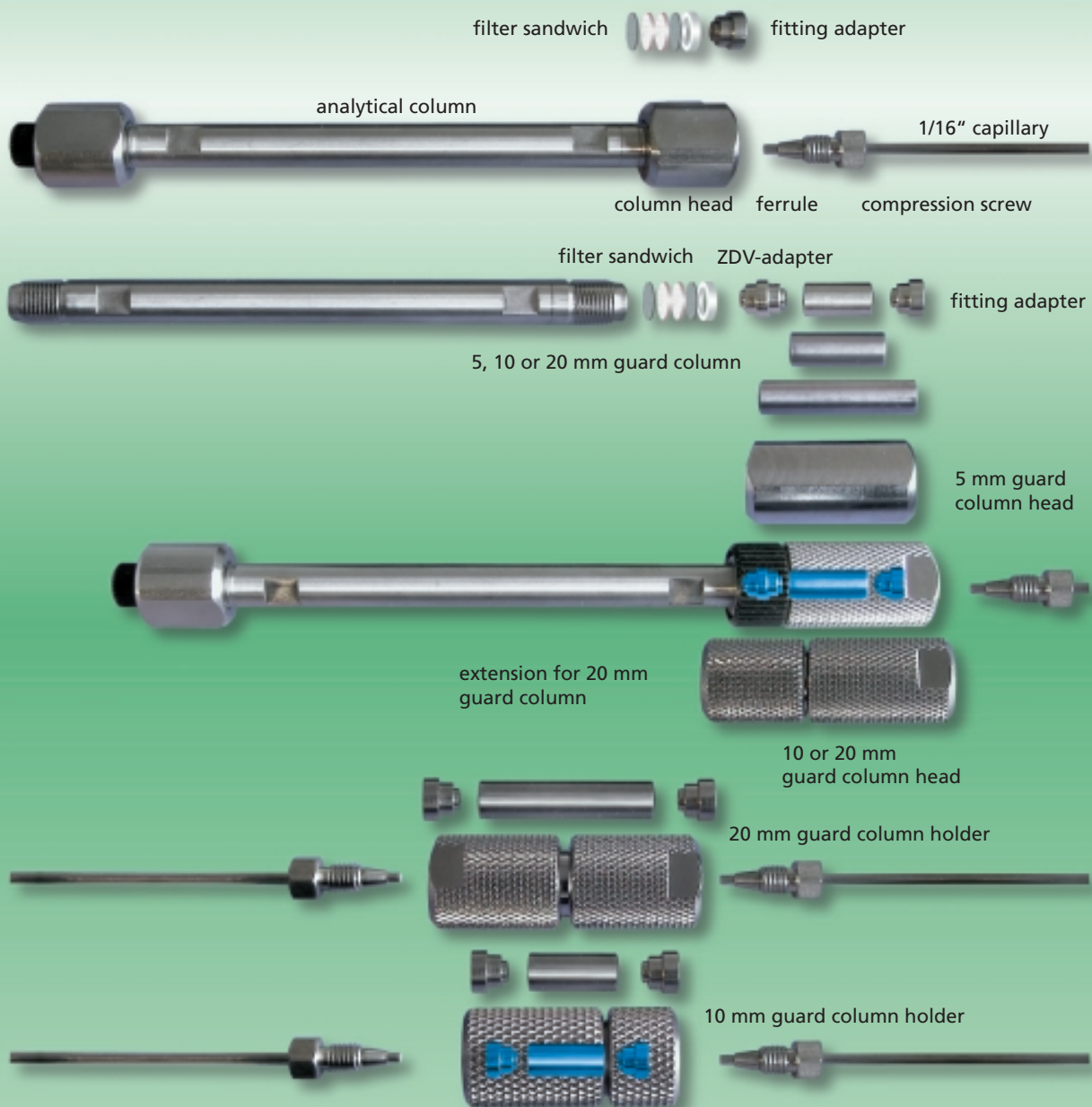
Capillaries with other dimensions available upon request

## ANALYTICAL **NovoGROM** COLUMNS – 3.0, 4.0, and 4.6 mm i.d. –

The analytical **NovoGROM HPLC column** system is many-fold proven. These columns can be connected to any HPLC system either conventionally via 1/16" capillary, ferrules and screw fittings or dead volume free via the **NovoGROM Quick** connectors. Standard dimensions are 3, 4 and 4.6 mm internal diameter and lengths of 2, 4, 6, 10, 12.5, 15, 20, 25 and 30 cm. Guard columns, i.e., protective precolumns, are available in the lengths of 5, 10 and 20 mm. Columns may be filled as often as is required in the economical refill service. Use of the 3 mm i.d. column results in a reduction in the consumption of solvent of ca. 43% or 57% compared to the 4 mm and 4.6 mm i.d. columns respectively. This not only reduces costs, but is also active environmental protection.

All **NovoGROM columns** can be supplied with any of the stationary phases listed on **GROM** websites or in this **GROM-HPLC catalogue** (see pages 12/13 and 144-151). Alternatively, they may also be packed by the **GROM filling service** with any stationary phase specified by the customer.

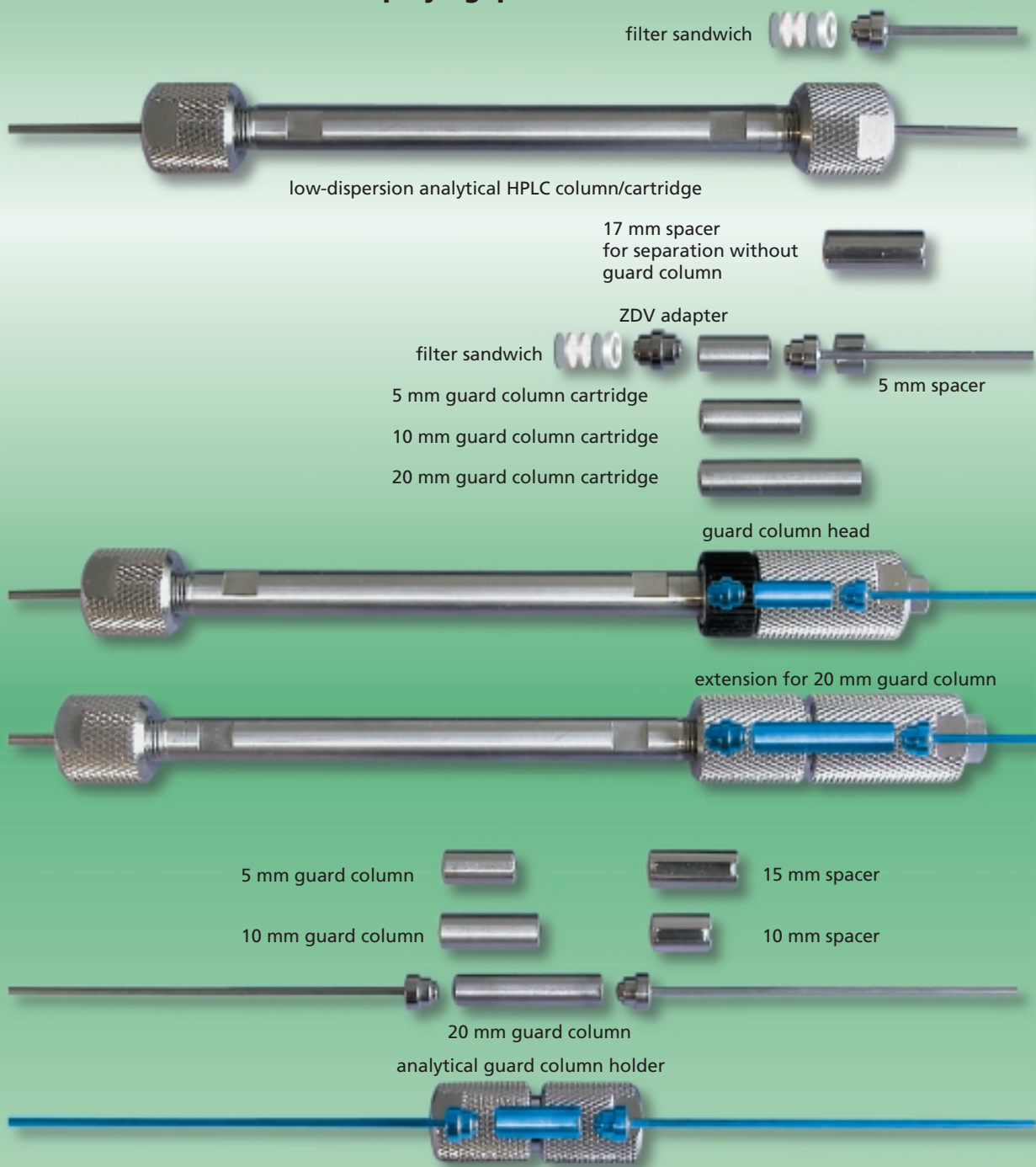
### Traditional ferrule-type fitting of **NovoGROM** columns



The **NovoGROM analytical column** system is simple to use and requires no tools („finger-tight“). It is practically dead volume free, thus providing maximum resolution. **NovoGROM stainless steel columns** are available in four versions:

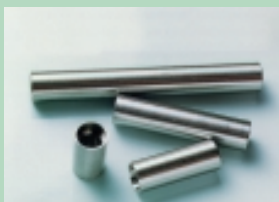
- Standard packed column, complete with column heads, gaskets and sieves
- Packed cartridge, with gaskets and sieves, ends sealed with screw caps.
- Empty column, complete with column heads, gaskets and sieves.
- Empty cartridge, with gaskets and sieves, ends sealed with screw caps.

### Modern, advanced low-dispersion HPLC-column hardware employing quick connectors



## Analytical HPLC columns, packed\*

## Order number Description \*



***... V0003V	Guard column, analytical,	5 x 3 mm (Pk. of 5)
***... V0103V	Guard column, analytical,	10 x 3 mm (Pk. of 5)
***... V0203V	Guard column, analytical,	20 x 3 mm (Pk. of 5)
***... V0403V	Guard column, analytical,	40 x 3 mm (Pk. of 5)
***... V0004V	Guard column, analytical,	5 x 4.0 mm (Pk. of 5)
***... V0104V	Guard column, analytical,	10 x 4.0 mm (Pk. of 5)
***... V0204V	Guard column, analytical,	20 x 4.0 mm (Pk. of 5)
***... V0404V	Guard column, analytical,	40 x 4.0 mm (Pk. of 5)
***... V0005V	Guard column, analytical,	5 x 4.6 mm (Pk. of 5)
***... V0105V	Guard column, analytical,	10 x 4.6 mm (Pk. of 5)
***... V0205V	Guard column, analytical,	20 x 4.6 mm (Pk. of 5)
***... V0405V	Guard column, analytical,	40 x 4.6 mm (Pk. of 5)



***... S0203, resp. ***... K0203	Column (S) or cartridge (K), analytical,	20 x 3 mm
***... S0403, resp. ***... K0403	Column (S) or cartridge (K), analytical,	40 x 3 mm
***... S0503, resp. ***... K0503	Column (S) or cartridge (K), analytical,	50 x 3 mm
***... S0603, resp. ***... K0603	Column (S) or cartridge (K), analytical,	60 x 3 mm
***... S0803, resp. ***... K0803	Column (S) or cartridge (K), analytical,	75 x 3 mm
***... S1003, resp. ***... K1003	Column (S) or cartridge (K), analytical,	100 x 3 mm
***... S1203, resp. ***... K1203	Column (S) or cartridge (K), analytical,	125 x 3 mm
***... S1503, resp. ***... K1503	Column (S) or cartridge (K), analytical,	150 x 3 mm
***... S2003, resp. ***... K2003	Column (S) or cartridge (K), analytical,	200 x 3 mm
***... S2503, resp. ***... K2503	Column (S) or cartridge (K), analytical,	250 x 3 mm
***... S3003, resp. ***... K3003	Column (S) or cartridge (K), analytical,	300 x 3 mm
***... S0204, resp. ***... K0204	Column (S) or cartridge (K), analytical,	20 x 4.0 mm
***... S0404, resp. ***... K0404	Column (S) or cartridge (K), analytical,	40 x 4.0 mm
***... S0504, resp. ***... K0504	Column (S) or cartridge (K), analytical,	50 x 4.0 mm
***... S0604, resp. ***... K0604	Column (S) or cartridge (K), analytical,	60 x 4.0 mm
***... S0804, resp. ***... K0804	Column (S) or cartridge (K), analytical,	75 x 4.0 mm
***... S1004, resp. ***... K1004	Column (S) or cartridge (K), analytical,	100 x 4.0 mm
***... S1204, resp. ***... K1204	Column (S) or cartridge (K), analytical,	125 x 4.0 mm
***... S1504, resp. ***... K1504	Column (S) or cartridge (K), analytical,	150 x 4.0 mm
***... S2004, resp. ***... K2004	Column (S) or cartridge (K), analytical,	200 x 4.0 mm
***... S2504, resp. ***... K2504	Column (S) or cartridge (K), analytical,	250 x 4.0 mm
***... S3004, resp. ***... K3004	Column (S) or cartridge (K), analytical,	300 x 4.0 mm
***... S0205, resp. ***... K0205	Column (S) or cartridge (K), analytical,	20 x 4.6 mm
***... S0405, resp. ***... K0405	Column (S) or cartridge (K), analytical,	40 x 4.6 mm
***... S0505, resp. ***... K0505	Column (S) or cartridge (K), analytical,	50 x 4.6 mm
***... S0605, resp. ***... K0605	Column (S) or cartridge (K), analytical,	60 x 4.6 mm
***... S0805, resp. ***... K0805	Column (S) or cartridge (K), analytical,	75 x 4.6 mm
***... S1005, resp. ***... K1005	Column (S) or cartridge (K), analytical,	100 x 4.6 mm
***... S1205, resp. ***... K1205	Column (S) or cartridge (K), analytical,	125 x 4.6 mm
***... S1505, resp. ***... K1505	Column (S) or cartridge (K), analytical,	150 x 4.6 mm
***... S2005, resp. ***... K2005	Column (S) or cartridge (K), analytical,	200 x 4.6 mm
***... S2505, resp. ***... K2505	Column (S) or cartridge (K), analytical,	250 x 4.6 mm
***... S3005, resp. ***... K3005	Column (S) or cartridge (K), analytical,	300 x 4.0 mm



To satisfy the highest demands for biocompatibility in biochemical applications, **NovoGROM** HPLC columns are also available in an inert poly-ether-ether-ketone (PEEK) version\*.

***... P0305	PEEK-column, analytical	- 30 x 4.6 mm
***... P0505	PEEK-column, analytical	- 50 x 4.6 mm
***... P1005	PEEK-column, analytical	- 100 x 4.6 mm
***... P1205	PEEK-column, analytical	- 125 x 4.6 mm
***... P1505	PEEK-column, analytical	- 150 x 4.6 mm
***... P2505	PEEK-column, analytical	- 250 x 4.6 mm
***... P3005	PEEK-column, analytical	- 300 x 4.6 mm

\* Analytical **NovoGROM** HPLC columns can be packed with any of the stationary phases listed in this catalogue or with the customer's stationary phase.

\*\* Other dimensions upon request.

\*\*\* To complete the order number, add here the abbreviation for the desired stationary phase (see pages 160-161).



**Order number Description\***

***... M0404	<b>NovoGROM PEEK-column</b> , 40 x 4.0 mm, complete
***... M0504	<b>NovoGROM PEEK-column</b> , 50 x 4.0 mm, complete
***... M0804	<b>NovoGROM PEEK-column</b> , 75 x 4.0 mm, complete
***... M1004	<b>NovoGROM PEEK-column</b> , 100 x 4.0 mm, complete
***... M1204	<b>NovoGROM PEEK-column</b> , 125 x 4.0 mm, complete
***... M1504	<b>NovoGROM PEEK-column</b> , 150 x 4.0 mm, complete
***... M2504	<b>NovoGROM PEEK-column</b> , 250 x 4.0 mm, complete
***... M3004	<b>NovoGROM PEEK-column</b> , 300 x 4.0 mm, complete
***... M0104V	<b>NovoGROM PEEK-guard column</b> , 10 x 4.0 mm (Pk. of 5), complete
***... M0104X	<b>NovoGROM PEEK-guard column</b> , 10 x 4.0 mm (Pk. of 10), complete
***... M0204V	<b>NovoGROM PEEK-guard column</b> , 20 x 4.0 mm (Pk. of 5), complete
***... M0204X	<b>NovoGROM PEEK-guard column</b> , 20 x 4.0 mm (Pk. of 10), complete



M2101 **NovoGROM PEEK-guard column head**, for 10 x 4.0 mm guard columns (PEEK ZDV adapter and PEEK fitting included)



M2102 **NovoGROM PEEK-guard column head**, for 20 x 4.0 mm guard columns (PEEK ZDV- and PEEK fitting adapter included)



M2201 **NovoGROM PEEK-guard column holder**, for 10 x 4.0 mm guard columns (2 x PEEK fitting adapters included)



M2202 **NovoGROM PEEK-guard column holder**, for 20 x 4.0 mm guard columns (2 x PEEK fitting adapters included)



M5019 **PEEK zero dead volume (ZDV) adapter**, analytical, for direct coupling of guard column



M6000 **PEEK frit**, 2 µm (1 piece)  
M6001 **PEEK frits**, 2 µm (3 pieces)



M6003 **PEEK fitting adapter**, analytical

\* Other dimensions upon request.

## System components and accessories for analytical **NovoGROM** HPLC columns

Finger-tight: blocked components (eg. from fines) are easily replaced without tools.

Order number	Description
1100	<b>Set of quick connectors</b> , analytical, for rapid manual, dead volume free connection of all analytical cartridges and standard columns, compatible with similar systems; consisting of two Quick connector heads (cap nuts) and two 250 x 0.25 mm i.d. capillaries with fitting adapters
1110	<b>Set of quick connectors</b> , analytical, same as 1100, but with 100 x 0.25 mm i.d. capillaries with fitting adapters
1200	<b>Set of quick connectors</b> , analytical, same as 1100, but with 250 x 0.12 mm i.d. capillaries with fitting adapters
1210	<b>Set of quick connectors</b> , analytical, same as 1100, but with 100 x 0.12 mm i.d. capillaries with fitting adapters
2100	<b>Guard column holder</b> , analytical, for 5, 10 and 20 mm analytical guard columns, manual assembly without tools, pressure rating 40 MPa, complete, including two capillaries with fitting adapters (250 mm x 0.25 mm i.d.) and two spacers for 5 and 10 mm guard columns
2200	<b>Guard column holder</b> , analytical, same as 2100, but with 250 mm x 0.12 mm i.d. capillaries
2220	<b>Guard column holder</b> , analytical, same as 2100, but supplied with two additional fitting adapters
2115	<b>Guard column holder</b> , analytical, for conventional connecting 20 mm guard column and conventional, ferrule-type connections
2116	<b>Guard column holder</b> , analytical, for conventional connecting 10 mm guard column and conventional, ferrule-type connections
3100	<b>Guard column head</b> , analytical, for the direct, dead volume free connection of analytical columns with 5, 10 or 20 mm guard columns - pressure rating 40 MPa - consisting of capillary with fitting adapter (250 mm x 0.25 mm i.d.), ZDV adapter and 2 spacers for 5 mm guard column or for operation without guard column
3200	<b>Guard column head</b> , analytical, same as 3100, but with 250 mm x 0.12 mm i.d. capillary with fitting adapter
3101	<b>Guard column head</b> , analytical, for 10 mm guard column and conventional, ferrule-type connections
3102	<b>Guard column head</b> , analytical, for 20 mm guard column and conventional, ferrule-type connections
3103	<b>Guard column holder</b> , analytical, for 5 mm guard column and conventional, ferrule-type connections
4100	<b>Guard column combination</b> , analytical, for the direct, dead-volume free connection of analytical columns with 5, 10 or 20 mm guard columns - pressure rating 40 MPa - consisting of one guard column head and one quick connector head, two capillaries with fitting adapters (250 mm x 0.25 mm i.d.), ZDV adapter and 2 spacers for 5 mm guard column or for operation without guard column.
4200	<b>Guard column combination</b> , analytical, same as in 4100, but with 250 mm x 0.12 mm i.d. capillaries with fitting adapter.

Order number	Description
5002	<b>Quick connector head</b> (cap nut), analytical
5010	<b>Spacers</b> , for 5 mm and 10 mm analytical guard columns (Pk. of 2)
5011	<b>Spacer</b> (15 mm) for guard column holder for 5 mm analytical guard column
5012	<b>Spacer</b> (10 mm) for guard column holder for 10 mm analytical guard column
5013	<b>Spacer</b> (17 mm) for guard column head, analytical, for operation without guard column
5014	<b>Spacer</b> (5 mm) for guard column head for 5 mm analytical guard column
5019	<b>Zero dead volume (ZDV) adapter</b> for connecting analytical guard column to analytical column
5020	<b>Spacer set</b> for operation with 5, 10 or 20 mm or without analytical guard columns (Items 5011-5014)
5030	<b>Extension</b> for analytical guard column holder to allow use of 40 mm guard columns
5050	<b>Capillary</b> , 50 x 0.25 mm, with fitting adapter, analytical
5051	<b>Capillary</b> , 100 x 0.25 mm, with fitting adapter, analytical
5052	<b>Capillary</b> , 250 x 0.25 mm, with fitting adapter, analytical
5053	<b>Capillary</b> , 500 x 0.25 mm, with fitting adapter, analytical
5054	<b>Capillary</b> , 700 x 0.25 mm, with fitting adapter, analytical
5055	<b>Capillary</b> , 50 x 0.12 mm, with fitting adapter, analytical
5056	<b>Capillary</b> , 100 x 0.12 mm, with fitting adapter, analytical
5057	<b>Capillary</b> , 250 x 0.12 mm, with fitting adapter, analytical
5058	<b>Capillary</b> , 500 x 0.12 mm, with fitting adapter, analytical
5059	<b>Capillary</b> , 800 x 0.12 mm, with fitting adapter, analytical
6001	<b>Coupling nut</b> for connecting two analytical columns or cartridges



**Order number**   **Description**  
 6002            **Column head**, analytical



6003            **Fitting adapter** for analytical column head



6011            **Screw plug** for column head (Pk. of 10)



6016            **Sealing caps** for analytical guard columns (Pk. of 20)



6017            **Screw caps** for closure of analytical cartridges (Pk. of 10)



6018P           **PE stopper** (cap) for analytical cartridges (Pk. of 10)



6021            **PTFE sealing gaskets**, analytical (Pk. of 40)

6022            **PTFE sealing gaskets**, analytical (Pk. of 100)



6030            **4x Filter-sieve sandwiches**, analytical, each sandwich consists of 2 stainless steel sieves, 2 glass fiber filters and 1 PTFE sealing gasket



6031            **Sieve set**, analytical, (8 stainless steel sieves, 12 glass fiber filters)

6032            **Sieve set**, analytical, (80 stainless steel sieves, 120 glass fiber filters)



6040            **Stainless steel sieves**, analytical, 10  $\mu\text{m}$  (Pk. of 100)  
 6041            **Stainless steel sieves**, analytical, 5  $\mu\text{m}$  (Pk. of 100)  
 6042            **Stainless steel sieves**, analytical, 3  $\mu\text{m}$  (Pk. of 100)  
 6044            **Stainless steel sieves**, analytical, 5  $\mu\text{m}$  (Pk. of 1000)  
 6045            **Stainless steel sieves**, analytical, 3  $\mu\text{m}$  (Pk. of 1000)



6052            **Glass fiber filters**, analytical (Pk. of 250)

6054            **Glass fiber filters**, analytical (Pk. of 1000)

# Column sets for the development

## Cost-effective method development: saves both time and solvent consumption

For the development of new analytical methods, in particular for the selection of the appropriate stationary phase in a minimum of time and with extremely low solvent consumption, GROM offers its new Method-Development-sets. These consist of five cartridges packed with stationary phases of differing selectivity.

The use of short columns (60mm) and small particles (generally 3  $\mu\text{m}$ , in a few cases 5  $\mu\text{m}$ ) results in significant savings of both time and solvent consumption in the process of optimising the various parameters of separation such as flow rate, eluent composition, temperature, gradient shape, etc. MD-Sets are available as cost-effective cartridges of 60 mm length and 2 or 4 mm internal diameter and can be operated with either standard column ends or with the **NovoGROM** quick connectors (see pages 107 and 113). With the microbore version (2 mm i.d.), the expenditure for solvents (purchase and disposal) is around 75% lower and the sensitivity approximately 4 times higher than with conventional 4 mm i.d. columns.

The combination of an MD-Set with an autoinjector and automatic column switching represents a highly convenient and elegant system for HPLC-method development. In order to guarantee highest quality, each column of the MD-Set is individually tested. The resolution attained not only allows effective screening of the experimental conditions, but often also fulfills many analytical requirements such as in product quality control or the monitoring of large-scale syntheses.

### Method-Development-Sets

Composed of five cartridges (60 x 4 mm or 60 x 2 mm) filled with stationary phases of differing selectivity (without column ends and without quick connectors). The particle diameter is generally 3  $\mu\text{m}$ .



# of chromatographic methods

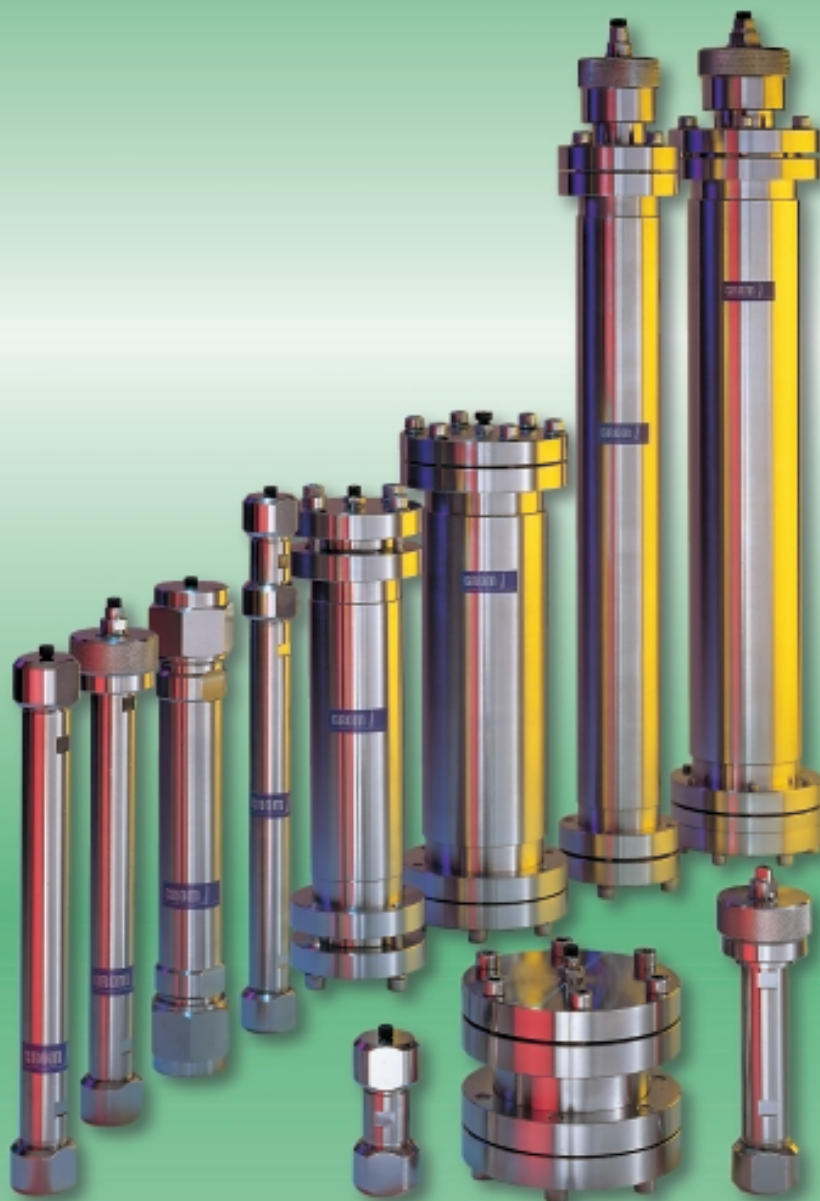
## Method Development Sets at a glance: 9 different Microbore MD-Sets and 8 analytical MD-Sets

<p><b>MD-Set for „Peptides“</b></p> <p>GROM-SIL 100 ODS-2 FE, 3 µm GROM-SIL 120 ODS-4 HE, 3 µm GROM-SIL 100 Octyl-2 AB, 3 µm GROM-SIL 120 Phenyl-2 CP, 5 µm GROM-SIL 120 Butyl-1 ST, 3 µm</p> <p>Order-Nr. GS ME1 0312 K 0602, resp. 04 (2 mm and 4 mm cartridges, respectively)</p>	<p><b>MD-Set for „Proteins“</b></p> <p>GROM-SIL 300 Octyl-5 CP, 5 µm GROM-SIL 300 Phenyl-2 CP, 5 µm GROM-SIL 300 Butyl-2 FE, 3 µm GROM-SIL 300 SA-1, 3 µm GROM-SIL 300 WC-2 7 µm</p> <p>Order-Nr. GS ME2 0530 K 0602, resp. 04 (2 mm and 4 mm cartridges, respectively)</p>	<p><b>MD-Set for „Standard Rev. Phases“ -decreasing hydrophobicity</b></p> <p>GROM-SIL 080 ODS-7 pH, 4 µm GROM-SIL 100 ODS-0 AB, 3 µm GROM-SIL 100 Octyl-4 FE, 3 µm GROM-SIL 120 Butyl-1 ST, 3 µm GROM-SIL 120 TMS-2 CP, 5 µm</p> <p>Order-Nr. GS ME3 0310 K 0602, resp. 04 (2 mm and 4 mm cartridges, respectively)</p>
<p><b>MD-Set for „Normal-Phase/ Reversed Phase“</b></p> <p>GROM-SIL 100 Amino-1 PR, 5 µm GROM-SIL 100 Cyan-2 PR, 3 µm GROM-SIL 120 Phenyl-2 CP, 5 µm GROM-SIL 120 TMS-2 CP, 5 µm GROM-SIL 100 Normal Ph-1, 3 µm</p> <p>Order-Nr. GS ME4 0510 K 0602, resp. 04 (2 mm and 4 mm cartridges, respectively)</p>	<p><b>MD-Set for „C 18-Phases“ -with differing pore sizes-</b></p> <p>GROM-SIL 080 ODS-2 FE, 3 µm GROM-SIL 120 ODS-3 CP, 3 µm GROM-SIL 200 ODS-5 ST, 3 µm GROM-SIL 300 ODS-2 FE, 3 µm GROM-SIL 500 ODS-2 FE, 5 µm</p> <p>Order-Nr. GS ME5 0399 K 0602, resp. 04 (2 mm and 4 mm cartridges, respectively)</p>	<p><b>MD-Set for „C18-Phases“ -with differing C-content-</b></p> <p>GROM-SIL 100 ODS-1 PE, 3 µm GROM-SIL 100 ODS-2 FE, 3 µm GROM-SIL 120 ODS-3 CP, 3 µm GROM-SIL 120 ODS-5 ST, 3 µm GROM-SIL 080 ODS-7 pH, 4 µm</p> <p>Order-Nr. GS ME6 0312 K 0602, resp. 04 (2 mm and 4 mm cartridges, respectively)</p>
<p><b>MD-Set for „Basic Compounds“</b></p> <p>GROM-SIL 100 ODS-0 AB, 3 µm GROM-SIL 120 ODS-3 CP, 3 µm GROM-SIL 100 Octyl-2 AB, 3 µm GROM-SIL 120 Octyl-3 BA, 3 µm GROM-SIL 120 Phenyl-2 CP, 5 µm</p> <p>Order-Nr. GS ME7 0312 K 0602, resp. 04 (2 mm and 4 mm cartridges, respectively)</p>	<p><b>MD-Set for „Chiral Separations“ -in 'normal' or 'reversed' mode-</b></p> <p>CHIRA-GROM 1, 8 µm CHIRA-GROM 2, 8 µm CHIRA-GROM 3, 8 µm CHIRA-GROM 4, 8 µm CHIRA-GROM 9, 8 µm</p> <p>Order-Nr. GS ME8 0891 K 06 02 (2 mm cartridges)</p>	<p><b>MD-Set for „Free Choice“ -custom assortment-</b></p> <p>consisting of 5 MD-cartridges with different, customer specified GROM SIL phases (except chiral phases)</p> <p>Please contact us for help!</p> <p>Order-Nr. GS ME 9 0000 K 06 02, resp. 04 (2 mm and 4 mm cartridges, respectively)</p>

**Note!** Method-Development means in German „Methoden-Entwicklung“; therefore order numbers are always GS ME

## SEMI-PREPERATIVE- and PREPARATIVE NovoGROM HPLC-Columns - 0.8 to 10.0 cm i.d. -

Semi-preparative- and preparative **NovoGROM columns** in various dimensions, made of stainless steel or glass are available both empty or packed with any of the **GROM stationary phases** or with stationary phases from other manufacturers. Selection of a suitable stationary phase for preparative separation is greatly facilitated by the **GROM Method-Development Sets**. The Up-scaling sets (page 136) then assist in transferring the analytical-scale separation to a preparative scale with a minimum of effort.



**Note !** Each of these items can be purchased as an empty column or ready-packed with one of the stationary phases described in this catalogue, as well with any other stationary phase chosen by the customer himself (such as Novarose materials, Toyopearl resins, etc.).

## NovoGROM HPLC columns made from glass

In addition to the unique stainless steel **NovoGROM columns**, **GROM** offers three different types of glass column hardware

**NovoGROM ECO glass columns** are appropriate for all soft gels and aqueous eluents like buffers, etc. Variable bed volumes are adjustable via adapters. Jackets for temperature control are also available as an option.



Order number	Description i. d.	max. bed length	bed volume	max. pressure
***... G2010Z	10 mm	200 mm	0 - 16 ml	1.0 MPa
***... G4510Z	10 mm	450 mm	20 - 35 ml	1.0 MPa
***... G9910Z	10 mm	999 mm	63 - 78 ml	1.0 MPa
***... G2015Z	15 mm	200 mm	0 - 35 ml	1.0 MPa
***... G4515Z	15 mm	450 mm	44 - 80 ml	1.0 MPa
***... G9915Z	15 mm	999 mm	141 - 176 ml	1.0 MPa
***... G2020Z	20 mm	200 mm	0 - 63 ml	1.0 MPa
***... G4520Z	20 mm	450 mm	79 - 141 ml	1.0 MPa
***... G9920Z	20 mm	999 mm	251 - 314 ml	1.0 MPa
***... G2025Z	25 mm	200 mm	0 - 98 ml	1.0 MPa
***... G4525Z	25 mm	450 mm	123 - 220 ml	1.0 MPa
***... G9925Z	25 mm	999 mm	392 - 490 ml	1.0 MPa
***... G2032Z	32 mm	200 mm	0 - 161 ml	1.0 MPa
***... G4532Z	32 mm	450 mm	201 - 362 ml	1.0 MPa
***... G9932Z	32 mm	999 mm	642 - 803 ml	1.0 MPa
***... G2050Z	50 mm	200 mm	0 - 390 ml	1.0 MPa
***... G4550Z	50 mm	450 mm	490 - 880 ml	1.0 MPa
***... G9950Z	50 mm	999 mm	1570 - 1960 ml	1.0 MPa

**NovoGROM BIO Glass Columns** are unique and versatile and are especially dedicated to biochemical applications. This outstanding column hardware meets all the needs defined by biochemists when applying high salt concentrations ion exchange or hydrophobic interaction chromatography, for instance. Due to their high maximum pressure limits they also perform rather well in normal phase, reversed phase and flash chromatography applications. The specifications of these outstanding columns are as follows: the calibrated tube is boro-silicate glass, the column head is adjustable, the fritts (pore size 2 or 10  $\mu\text{m}$ ) consist of sintered glass, the lamelle seals are of PTFE and the cartridge holder is made from anodized aluminium.



	i. d.	bed length	bed volume	max. pressure
***... G1205L	5 mm	0 - 120 mm	0 - 2.4 ml	9.0 MPa
***... G1205T	5 mm	60 - 120 mm	1.2 - 2.4 ml	9.0 MPa
***... G2605L	5 mm	140 - 260 mm	2.8 - 5.2 ml	9.0 MPa
***... G2605T	5 mm	200 - 260 mm	4.0 - 5.2 ml	9.0 MPa
***... G1210L	10 mm	0 - 120 mm	0 - 9.4 ml	8.0 MPa
***... G1210T	10 mm	60 - 120 mm	4.7 - 9.4 ml	8.0 MPa
***... G2610L	10 mm	140 - 260 mm	11.0 - 20.0 ml	8.0 MPa
***... G2610T	10 mm	200 - 260 mm	15.6 - 20.0 ml	8.0 MPa
***... G1215L	15 mm	0 - 120 mm	0 - 21.0 ml	7.0 MPa
***... G1215T	15 mm	60 - 120 mm	10.5 - 21.0 ml	7.0 MPa
***... G2615L	15 mm	140 - 260 mm	25.0 - 46.0 ml	7.0 MPa
***... G2615T	15 mm	200 - 260 mm	35.0 - 46.0 ml	7.0 MPa
***... G1220L	20 mm	0 - 120 mm	0 - 38 ml	6.0 MPa
***... G1220T	20 mm	60 - 120 mm	19 - 38 ml	6.0 MPa
***... G2620L	20 mm	140 - 260 mm	44 - 92 ml	6.0 MPa
***... G2620T	20 mm	200 - 260 mm	63 - 92 ml	6.0 MPa
***... G1225L	25 mm	0 - 120 mm	0 - 59 ml	5.0 MPa
***... G1225T	25 mm	60 - 120 mm	29 - 59 ml	5.0 MPa
***... G2625L	25 mm	140 - 260 mm	68 - 127 ml	5.0 MPa
***... G2625T	25 mm	200 - 260 mm	98 - 127 ml	5.0 MPa

- stable up to 50-90 bar
- low dispersion hardware
- calibrated glass tube
- fast and easy replacement of cartridge
- quick adjustment of column head
- decent, economical pricing
- fully biocompatible
- for universal usage
- no extra-column band broadening
- visible gel / packing
- no tools needed
- convenient, easy to handle
- cost saving refill service
- resistant to ammonium sulfate, sodium chloride, TFA etc.

**NovoGROM PREP Glass Columns** are well-designed for Up-Scaling in all common chromatographical techniques. These preparative glass columns are unmatched for conducting the different methods used in preparative high performance liquid chromatography, such as ion exchange-, hydrophobic interaction or size exclusion chromatography, as well as normal phase- or reversed phase chromatography. These columns are chemically inert, show excellent flow dispersion and are well suited to medium pressure chromatography. These columns are equipped with two adjustable column heads at both ends of the column. They are available packed with any of the stationary phases described in this catalogue or with materials from other manufacturers (like ODS-Prep from TosohHaas or ODS-AQ S-20 from YMC). Further, the prompt, quickly responding **GROM Refill Service** will enable drastical cost saving on future refills of this hardware.



Order number	Description i. d.	max. length	bed volume ml	max. pressure
***... G1010P	10 mm	100 mm	1–8 ml	8.0 MPa
***... G2510P	10 mm	250 mm	13–20 ml	8.0 MPa
***... G5010P	10 mm	500 mm	32–39 ml	8.0 MPa
***... G1015P	15 mm	100 mm	2–18 ml	7.0 MPa
***... G2515P	15 mm	250 mm	28–44 ml	7.0 MPa
***... G5015P	15 mm	500 mm	72–88 ml	7.0 MPa
***... G1025P	25 mm	100 mm	5–49 ml	5.0 MPa
***... G2525P	25 mm	250 mm	79–123 ml	5.0 MPa
***... G5025P	25 mm	500 mm	201–245 ml	5.0 MPa
***... G1035P	35 mm	100 mm	10–96 ml	5.0 MPa
***... G2535P	35 mm	250 mm	154–240 ml	5.0 MPa
***... G5035P	35 mm	500 mm	394–481 ml	5.0 MPa
***... G1050P	50 mm	100 mm	20–196 ml	5.0 MPa
***... G2550P	50 mm	250 mm	314–491 ml	5.0 MPa
***... G5050P	50 mm	500 mm	805–981 ml	5.0 MPa

The specifications of these columns are as follows: the glass tube is borosilicate, the adjustable shaft is made from PTFE and the, the lamelle seals from PTFE and the fritts (pore size 5 or 10 µm) are of sintered steel.

### Semi-preparative stainless steel and PEEK **NovoGROM** columns, 8 mm i.d., packed\*

These columns can be packed with any of the stationary phases listed in the HPLC catalog or with the customer's stationary phase.



Order number	Description**
***...V0108	<b>Guard column cartridge</b> , semi-preparative, stainless steel, 10 x 8 mm
***...V0208	<b>Guard column cartridge</b> , semi-preparative, stainless steel, 20 x 8 mm



***...V0408	<b>Guard column</b> , semi-preparative, stainless steel, 40 x 8 mm, complete 1 x connecting nut and ZDV adaptor
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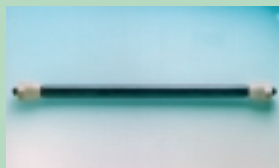
***...S0408	<b>HPLC column, semi-preparativ, stainless steel</b> , 40 x 8 mm, (complete)
***...S0508	<b>HPLC column, semi-preparativ, stainless steel</b> , 50 x 8 mm, (complete)
***...S0808	<b>HPLC column, semi-preparativ, stainless steel</b> , 75 x 8 mm, (complete)
***...S1008	<b>HPLC column, semi-preparativ, stainless steel</b> , 100 x 8 mm, (complete)
***...S1208	<b>HPLC column, semi-preparativ, stainless steel</b> , 125 x 8 mm, (complete)
***...S1508	<b>HPLC column, semi-preparativ, stainless steel</b> , 150 x 8 mm, (complete)
***...S2008	<b>HPLC column, semi-preparativ, stainless steel</b> , 200 x 8 mm, (complete)
***...S2508	<b>HPLC column, semi-preparativ, stainless steel</b> , 250 x 8 mm, (complete)
***...S3008	<b>HPLC column, semi-preparativ, stainless steel</b> , 300 x 8 mm, (complete)
***...S5008	<b>HPLC column, semi-preparativ, stainless steel</b> , 500 x 8 mm, (complete)

\* **NovoGROM** semi-preparative columns can be packed with any of the stationary phases listed in this catalogue or with the customer's stationary phase.

\*\* Other dimensions upon request.

\*\*\* To complete the order number, add here the abbreviation for the desired stationary phase (see HPLC catalogue pages 160-161).

## Biocompatible, semi-preparative **NovoGROM**-PEEK columns, especially suited for biochemical applications, packed\*



### Order number Description\*\*

***... P0508	<b>PEEK column, semi-preparative, 50 x 7.5 mm, (complete)</b>
***... P0808	<b>PEEK column, semi-preparative, 75 x 7.5 mm, (complete)</b>
***... P1508	<b>PEEK column, semi-preparative, 150 x 7.5 mm, (complete)</b>
***... P2508	<b>PEEK column, semi-preparative, 250 x 7.5 mm, (complete)</b>
***... P3008	<b>PEEK column, semi-preparative, 300 x 7.5 mm, (complete)</b>

## Accessories for semi-preparative 8 mm i.d. stainless steel and PEEK **NovoGROM** columns



50.2111 **Stainless steel guard column holder**, semi-preparative, for 10 x 8 mm guard column cartridges



50.2112 **Stainless steel guard column holder**, semi-preparative, for 20 x 8 mm guard column cartridges



50.3111 **Stainless steel guard column head**, semi-preparative, for 10 x 8 mm guard column cartridges



50.3112 **Stainless steel guard column head**, semi-preparative, for 20 x 8 mm guard column cartridges



50.100 **Connecting nut**, semi-preparative, with ZDV-adaptor for direct coupling of two 8 mm i.d. columns



50.110 **Connecting nut**, semi-preparative, for direct coupling of two 8 mm i.d. columns.



50.120 **ZDV-adaptor** (stainless steel insert), semi-preparative, for 8 mm i.d. columns



50.200 **Column head**, semi-preparative, for 8 mm i.d. columns

\* **NovoGROM** semi-preparative columns can be packed with any of the stationary phases listed in this catalogue or with the customer's stationary phase.

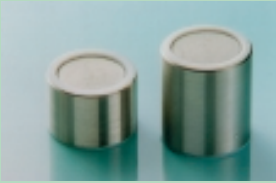

\*\* Other dimensions upon request.

\*\*\* To complete the order number, add here the abbreviation for the desired stationary phase (see HPLC catalogue pages 160-161).

	Order number	Description
	50.210	<b>Fitting adapter</b> , semi-preparative, for 8 mm i.d. columns
	50.220	<b>Screw cap</b> for semi-preparative, for 8 mm i.d. columns (Pkt. of 1)
	50.300	<b>Sealing gasket</b> , semi-preparative, , for 8 mm i.d. columns (Pkt. of 10)
	50.350	<b>Sieve set</b> , semi-preparative, (8 stainless steel sieves and 12 glass fiber filters), for 8 mm i.d. columns
	50.380	<b>Glass fiber filters</b> , semi-preparative, for 8 mm i.d. columns (Pkt. of 20)
	50.400	<b>Stainless steel sieves, 5µm</b> , semi-preparative, (Pkt. of 10)
	50.401	<b>Stainless steel sieves, 7µm</b> , semi-preparative, (Pkt. of 10)
	50.402	<b>Stainless steel sieves, 10µm</b> , semi-preparative, (Pkt. of 10)

Preparative stainless steel **NovoGROM** HPLC columns are simple to use and have excellent long-term stability. guard columns can be coupled either directly or via a capillary to the preparative column.

**Preparative stainless steel *NovoGROM* columns, 20 mm i.d., packed\***

	Order number	Description**
	*** ... V0120	<b>Guard column cartridge</b> , semi-preparative, 10 x 20 mm
	*** ... V0220	<b>Guard column cartridge</b> , semi-preparative, 20 x 20 mm
	*** ... S0320u	<b>Guard column</b> , 30 x 20 mm, complete
	*** ... S0420u	<b>Guard column</b> , 40 x 20 mm, complete
	*** ... S0520u	<b>Guard column</b> , 50 x 20 mm, complete

\* **NovoGROM** semi-preparative columns can be packed with any of the stationary phases listed in this catalogue or with the customer's stationary phase.  
 \*\* Other dimensions upon request.  
 \*\*\* To complete the order number, add here the abbreviation for the desired stationary phase (see HPLC catalogue pages 160-161).



**Order number Description \***

***...S0320	<b>HPLC column, preparative, stainless steel, 30 x 20 mm, complete</b>
***...S0420	<b>HPLC column, preparative, stainless steel, 40 x 20 mm, complete</b>
***...S0520	<b>HPLC column, preparative, stainless steel, 50 x 20 mm, complete</b>
***...S0820	<b>HPLC column, preparative, stainless steel, 75 x 20 mm, complete</b>
***...S1020	<b>HPLC column, preparative, stainless steel, 100 x 20 mm, complete</b>
***...S1220	<b>HPLC column, preparative, stainless steel, 125 x 20 mm, complete</b>
***...S1520	<b>HPLC column, preparative, stainless steel, 150 x 20 mm, complete</b>
***...S2520	<b>HPLC column, preparative, stainless steel, 250 x 20 mm, complete</b>
***...S3020	<b>HPLC column, preparative, stainless steel, 300 x 20 mm, complete</b>
***...S5020	<b>HPLC column, preparative, stainless steel, 500 x 20 mm, complete</b>

**Accessories for preparative 20 mm *NovoGROM* HPLC columns**



70.2111 **Stainless steel guard column holder, preparative, for 10 x 20 mm cartridges**



70.2112 **Stainless steel guard column holder, preparative, for 20 x 20 mm cartridges**



70.3111 **Stainless steel guard column head, preparative, for 10 x 20 mm cartridges**



70.3112 **Stainless steel guard column head, preparative, for 20 x 20 mm cartridges**



70.100 **Connector with stainless steel frit for direct coupling of two 20 mm i.d. columns**



70.110 **Connector for coupling two 20 mm i.d. columns**



70.200 **Column head, preparative, for 20 mm i.d. columns**



70.210 **Fitting adapter for 20 mm i.d. columns**



70.400 **Stainless steel frit with PTFE gasket for 20 mm i.d. columns**

## Preparative **NovoGROM** HPLC columns in stainless steel, 30 to 100 mm i.d., packed\*



Order number	Description **
75.2112	<b>Guard column holder</b> for 20 x 30 mm guard column cartridge
75.2113	<b>Guard column holder</b> for 30 x 30 mm guard column cartridge



***... V0230	<b>Guard column cartridge, preparative</b> , 20 x 30 mm, complete
***... V0330	<b>Guard column cartridge, preparative</b> , 30 x 30 mm, complete



***... S0530	<b>HPLC column, preparative</b> , stainless steel, 50 x 30 mm, (complete)
***... S0830	<b>HPLC column, preparative</b> , stainless steel, 75 x 30 mm, (complete)
***... S1030	<b>HPLC column, preparative</b> , stainless steel, 100 x 30 mm, (complete)
***... S1230	<b>HPLC column, preparative</b> , stainless steel, 125 x 30 mm, (complete)
***... S1530	<b>HPLC column, preparative</b> , stainless steel, 150 x 30 mm, (complete)
***... S2530	<b>HPLC column, preparative</b> , stainless steel, 250 x 30 mm, (complete)

***... S0440u	<b>Stainless steel guard column</b> 40 x 40 mm, (complete)
***... S1240	<b>HPLC column, preparative</b> , stainless steel, 125 x 40 mm, (complete)
***... S2540	<b>HPLC column, preparative</b> , stainless steel, 250 x 40 mm, (complete)
***... S5040	<b>HPLC column, preparative</b> , stainless steel, 500 x 40 mm, (complete)

***... S0463u	<b>Stainless steel guard column</b> 40 x 63 mm, (complete)
***... S1263	<b>HPLC column, preparative</b> , stainless steel, 125 x 60 mm, (complete)
***... S2563	<b>HPLC column, preparative</b> , stainless steel, 250 x 63 mm, (complete)
***... S3063	<b>HPLC column, preparative</b> , stainless steel, 300 x 63 mm, (complete)
***... S5063	<b>HPLC column, preparative</b> , stainless steel, 500 x 63 mm, (complete)

***... S0475u	<b>Stainless steel guard column</b> 50 x 75 mm, (complete)
***... S2575	<b>HPLC column, preparative</b> , stainless steel, 250 x 75 mm, (complete)
***... S5075	<b>HPLC column, preparative</b> , stainless steel, 500 x 75 mm, (complete)
***... S0499u	<b>Stainless steel guard column</b> 50 x 100 mm, (complete)
***... S2599	<b>HPLC column, preparative</b> , stainless steel, 250 x 100 mm, (complete)
***... S3099	<b>HPLC column, preparative</b> , stainless steel, 300 x 100 mm, (complete)
***... S5099	<b>HPLC column, preparative</b> , stainless steel, 500 x 100 mm, (complete)

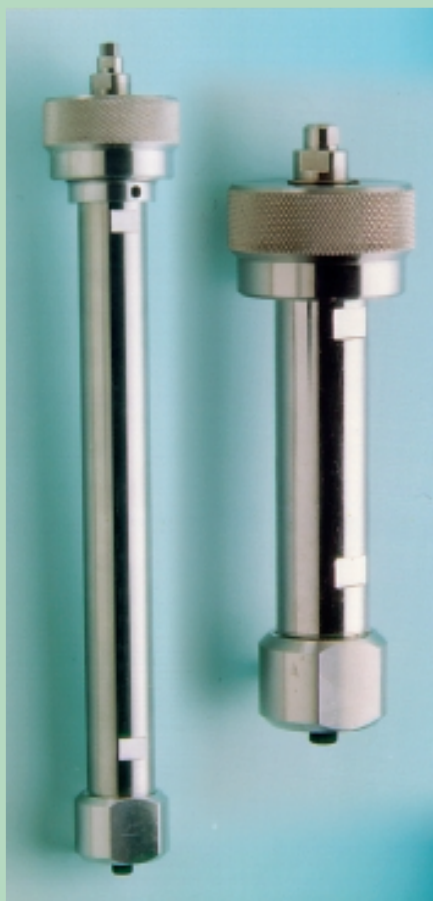
\* **NovoGROM** semi-preparative columns can be packed with any of the stationary phases listed in this catalogue or with the customer's stationary phase.

\*\* Other dimensions upon request.

\*\*\* To complete the order number, add here the abbreviation for the desired stationary phase (see HPLC catalogue pages 160-161).

## Axially compressible, preparative **NovoGROM-HPLC** columns in stainless steel, 20 to 100 mm i.d., packed\*

Shrinkage of the packing can be compensated for by re-positioning the adapter at the entrance of the column. In this way, dead volume between the frit and the packing is avoided, thus maintaining resolution.



### Order number    Description \*\*

***... B0520	<b>BIAX-column</b> , preparative, 50 x 20 mm, (complete)
***... B1220	<b>BIAX-column</b> , preparative, 125 x 20 mm, (complete)
***... B2520	<b>BIAX-column</b> , preparative, 250 x 20 mm, (complete)
***... B1240	<b>BIAX-column</b> , preparative, 125 x 40 mm, (complete)
***... B2540	<b>BIAX-column</b> , preparative, 250 x 40 mm, (complete)
***... B5040	<b>BIAX-column</b> , preparative, 500 x 40 mm, (complete)
***... B1260	<b>BIAX-column</b> , preparative, 125 x 60 mm, (complete)
***... B3060	<b>BIAX-column</b> , preparative, 300 x 60 mm, (complete)
***... B5060	<b>BIAX-column</b> , preparative, 500 x 60 mm, (complete)
***... B2599	<b>BIAX-column</b> , preparative, 250 x 100 mm, (complete)
***... B5099	<b>BIAX-column</b> , preparative, 500 x 100 mm, (complete)

\* **NovoGROM** preparative columns can be packed with any of the stationary phases listed in this catalogue or with the customer's stationary phase.

\*\* Other dimensions upon request.

\*\*\* To complete the order number, add here the abbreviation for the desired stationary phase (see HPLC catalogue pages 160-161).

## ACCESSORIES, FITTINGS and tools for HPLC



### Order number Description



- 6062 **Compression screws** for 1/16" capillaries, short (Pk. of 25)  
 6063 **Compression screws** for 1/16" capillaries, short (Pk. of 100)



- 6065 **Compression screws** for 1/16" capillaries, long (Pk. of 25)  
 6066 **Compression screws** for 1/16" capillaries, long (Pk. of 100)



- 6067 **Compression screws**, extra long - RHEODYNE type (Pk. of 10)  
 6068 **Compression screws**, extra long - RHEODYNE type (Pk. of 25)



- 6072 **Steel ferrules** for 1/16" capillaries (Pk. of 25)  
 6073 **Steel ferrules** for 1/16" capillaries (Pk. of 100)



- 6074 **Ferrules**, RHEODYNE type (Pk. of 10)  
 6075 **Ferrules**, RHEODYNE type (Pk. of 25)



- 6081 **PTFE ferrules**, for 1/16" capillaries (Pk. of 50)  
 6082 **PTFE ferrules**, for 1/16" capillaries (Pk. of 100)  
 6083 **PTFE ferrules**, for 1/16" capillaries (Pk. of 250)



- 6100 **DYNASEAL** capillary fitting, complete (Pk. of 4)



**Order number**   **Description**  
 6101            **DYNASEAL** replacement kit (30 polymer ferrules)



6102            **DYNASEAL ferrules**, pliers type (Pk. of 4)



6935            **Capillary connector** for coupling 1/16" capillary with fused silica capillary, without sleeve



6937P           **Finger-tight fitting** for coupling 1/16" capillary (Pk. of 2)



6938P           **Plug** for connector 6935 (Pk. of 2)



8010            **Coupling**, ZDV, for 1/16" capillaries, female (Pk. of 5)

8011            **Coupling**, ZDV, for 1/16" capillaries, female (Pk. of 10)



8030            **Union tee**, ZDV type connector for 3 1/16" capillaries



8032            **Cross**, ZDV type connector for 4 1/16" capillaries



9600            **PTFE frit** for solvent suction tube (Pk. of 5)



9701            **High-pressure filter**, „in line“, complete with filter sandwich and 1/16" capillaries



7010            **Stainless steel capillary**, 1/16", 0.12 mm i.d. (3 m)  
 7011            **Stainless steel capillary**, 1/16", 0.25 mm i.d. (3 m)  
 7012            **Stainless steel capillary**, 1/16", 0.50 mm i.d. (3 m)  
 7013            **Stainless steel capillary**, 1/16", 0.70 mm i.d. (3 m)  
 7014            **Stainless steel capillary**, 1/16", 1.00 mm i.d. (3 m)

**Order number Description**

Stainless steel capillaries, machine cut (Pk. of 10);



7105	<b>Stainless steel capillary</b> , 1/16" o.d., 0.12 mm i.d., 50 mm length
7110	<b>Stainless steel capillary</b> , 1/16" o.d., 0.12 mm i.d., 100 mm length
7120	<b>Stainless steel capillary</b> , 1/16" o.d., 0.12 mm i.d., 200 mm length
7130	<b>Stainless steel capillary</b> , 1/16" o.d., 0.12 mm i.d., 300 mm length
7205	<b>Stainless steel capillary</b> , 1/16" o.d., 0.25 mm i.d., 50 mm length
7210	<b>Stainless steel capillary</b> , 1/16" o.d., 0.25 mm i.d., 100 mm length
7220	<b>Stainless steel capillary</b> , 1/16" o.d., 0.25 mm i.d., 200 mm length
7230	<b>Stainless steel capillary</b> , 1/16" o.d., 0.25 mm i.d., 300 mm length
7240	<b>Stainless steel capillary</b> , 1/16" o.d., 0.25 mm i.d., 400 mm length



7510	<b>PTFE tubing</b> , 1/16" o.d., 0.18 mm i.d. (length 5 m)
7511	<b>PTFE tubing</b> , 1/16" o.d., 0.25 mm i.d. (length 5 m)
7512	<b>PTFE tubing</b> , 1/16" o.d., 0.50 mm i.d. (length 5 m)
7513	<b>PTFE tubing</b> , 1/16" o.d., 0.75 mm i.d. (length 5 m)
7520	<b>PTFE tubing</b> , 1/8" o.d., 1.6 mm i.d. (length 5 m)
7521	<b>PTFE tubing</b> , 1/8" o.d., 2.4 mm i.d. (length 5 m)

**PEEK accessories**5001 **PEEK finger-tight fitting** for double-ferrule (Pk. of 1)5570 **PEEK finger-tight fitting** with double-ferrule (Pk. of 1)5003P **PEEK ferrule**, single (Pk. of 5)5004P **PEEK ferrule**, double (Pk. of 5)5005 **PEEK compression screw** for double-ferrule (Pk. of 1)5006 **PEEK filter** element5007P **Replacement frits** for 5006 (Pk. of 2)5008 **PEEK union**, without ferrules or fingertight compression screw (Pk. of 1)6091 **PEEK finger-tight compression screw** with integrated ferrule (Pk. of 1)

7705	<b>PEEK capillary</b> , 1/16" o.d. x 0.13 mm i.d., red (3 m length)
7710	<b>PEEK capillary</b> , 1/16" o.d. x 0.17 mm i.d., yellow (3 m length)
7711	<b>PEEK capillary</b> , 1/16" o.d. x 0.25 mm i.d., blue (3 m length)
7712	<b>PEEK capillary</b> , 1/16" o.d. x 0.50 mm i.d., orange (3 m length)
7713	<b>PEEK capillary</b> , 1/16" o.d. x 0.75 mm i.d., green (3 m length)

## Fused silica capillaries (POLYMICRO quality) for capillary HPLC, capillary electrophoresis and capillary electrochromatography



Order number	Description*
165025	<b>Fused silica capillary</b> , 165 µm o.d. x 25 µm i.d. (1 m)
165050	<b>Fused silica capillary</b> , 165 µm o.d. x 50 µm i.d. (1 m)
165075	<b>Fused silica capillary</b> , 165 µm o.d. x 75 µm i.d. (1 m)
165100	<b>Fused silica capillary</b> , 165 µm o.d. x 100 µm i.d. (1 m)
190025	<b>Fused silica capillary</b> , 190 µm o.d. x 25 µm i.d. (1 m)
190050	<b>Fused silica capillary</b> , 190 µm o.d. x 50 µm i.d. (1 m)
190075	<b>Fused silica capillary</b> , 190 µm o.d. x 75 µm i.d. (1 m)
190100	<b>Fused silica capillary</b> , 190 µm o.d. x 100 µm i.d. (1 m)
280025	<b>Fused silica capillary</b> , 280 µm o.d. x 25 µm i.d. (1 m)
280050	<b>Fused silica capillary</b> , 280 µm o.d. x 50 µm i.d. (1 m)
280075	<b>Fused silica capillary</b> , 280 µm o.d. x 75 µm i.d. (1 m)
280100	<b>Fused silica capillary</b> , 280 µm o.d. x 100 µm i.d. (1 m)
365025	<b>Fused silica capillary</b> , 365 µm o.d. x 25 µm i.d. (1 m)
365050	<b>Fused silica capillary</b> , 365 µm o.d. x 50 µm i.d. (1 m)
365075	<b>Fused silica capillary</b> , 365 µm o.d. x 75 µm i.d. (1 m)
365100	<b>Fused silica capillary</b> , 365 µm o.d. x 100 µm i.d. (1 m)

\* other dimensions upon request

### Accessories-Tools for HPLC



5905 **Cutting pliers** for steel capillaries



5910 **Spanner** (wrench), 5/16"-1/4"



5915 **Spanner** (wrench), 5 mm, for tightening MICRO columns



5940 **Guillotine**, for cutting plastic tubing



6904 **Tungsten carbide glass knife**, for cutting fused silica capillaries, etc.



6908 **PROCUT**, for cutting fused silica capillaries



69022 **Tubing cutter** for PTFE-, Tefzel-, PEEK tubings, etc.; it comes complete with guides for holding both 1/16" and 1/8" o.d. tubings

## Valves, spareparts and accessories

	Order number	Description*
	I 7010	<b>RHEODYNE sample injector 7010</b>
	I 7725	<b>RHEODYNE</b> 6-port injection valve Model 7725 including 20 µl sample loop. Advanced, outstanding analytical injector capable of reproducibile 2 µl sample injection with a 2 µl internal sample loop
	I 7125-047	<b>Rotor</b> (replacement) for 7125 and 7725
	I 7010-039	<b>Rotor</b> (replacement) for 7010
	6906	<b>Microinjector</b> , 60 nl injection volume
	6920	<b>Microinjector</b> , 200 nl injection volume
	6907	<b>Spare rotor</b> for 60 nl microinjector
	6921	<b>Spare rotor</b> for 200 nl microinjector
	IP 0005	<b>Sample loop</b> , for Rheodyne syringe injector, 5 µl
	IP 0010	<b>Sample loop</b> , for Rheodyne syringe injector, 10 µl
	IP 0020	<b>Sample loop</b> , for Rheodyne syringe injector, 20 µl
	IP 0050	<b>Sample loop</b> , for Rheodyne syringe injector, 50 µl
	IP 0100	<b>Sample loop</b> , for Rheodyne syringe injector, 100 µl
	IP 0200	<b>Sample loop</b> , for Rheodyne syringe injector, 200 µl
	IP 0500	<b>Sample loop</b> , for Rheodyne syringe injector, 500 µl
	IP 1000	<b>Sample loop</b> , for Rheodyne syringe injector, 1000 µl
	IP 2000	<b>Sample loop</b> , for Rheodyne syringe injector, 2000 µl
IP 5000	<b>Sample loop</b> , for Rheodyne syringe injector, 5000 µl	
	IS 0010	<b>Syringe for RHEODYNE valves</b> (fixed needle), 10 µl
	IS 0025	<b>Syringe for RHEODYNE valves</b> (fixed needle), 25 µl
	IS 0050	<b>Syringe for RHEODYNE valves</b> (fixed needle), 50 µl
	IS 0100	<b>Syringe for RHEODYNE valves</b> (fixed needle), 100 µl
	IS 0250	<b>Syringe for RHEODYNE valves</b> (fixed needle), 250 µl
	IS 0500	<b>Syringe for RHEODYNE valves</b> (fixed needle), 500 µl
	IS 1000	<b>Syringe for RHEODYNE valves</b> (fixed needle), 1000 µl

# Bulk Materials



20 mm i.d.



60 mm i.d.



100 mm i.d.

optimal bulk materials in optimal column hardware for  
**Preparative HPLC**

## „Up-scaling“- Column Set

For the scale-up of optimized analytical separations without unnecessary waste of expensive samples and solvents, **GROM** offers its „Up-scaling“ Sets. These consist of an analytical column (250 x 4 mm) and a preparative column (either 250 x 20 mm or 250 x 40 mm), both of which are filled with completely identical packing (i.e. from the same batch).

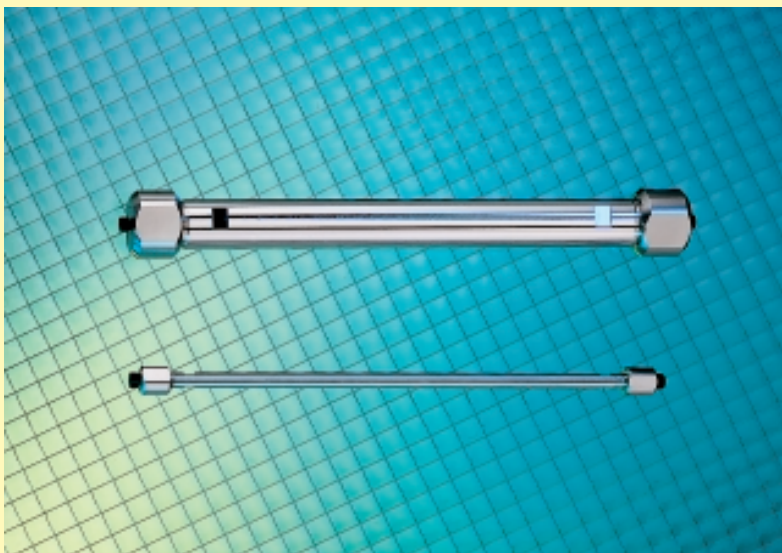
This means:

- identical particle diameter,
- identical pore radius,
- identical coating,
- and, most important, the same silica gel as starting material, guaranteeing identical selectivity of both columns.

A separation optimized on the analytical column (with savings of solvents - both purchase, preparation and disposal) will yield identical resolution when transferred under identical operating parameters (temperature, linear flow rate\*, etc.) to the preparative column. UP-sets thus help to avoid troublesome, time consuming experiments in transferring an analytical separation to a preparative scale.

This is particularly true when the analytical separation has been performed on a column filled with 3 µm diameter particles whereas the preparative column is packed with cheaper, coarser (e.g., 15 µm) particles, thus resulting in different selectivities of the two columns.

\* For constant linear flowrate:  
volumetric flowrate of the prep. column  
= (vol. flow rate of the analytical column / cross-section of the anal. column) x cross-section of the prep. column.

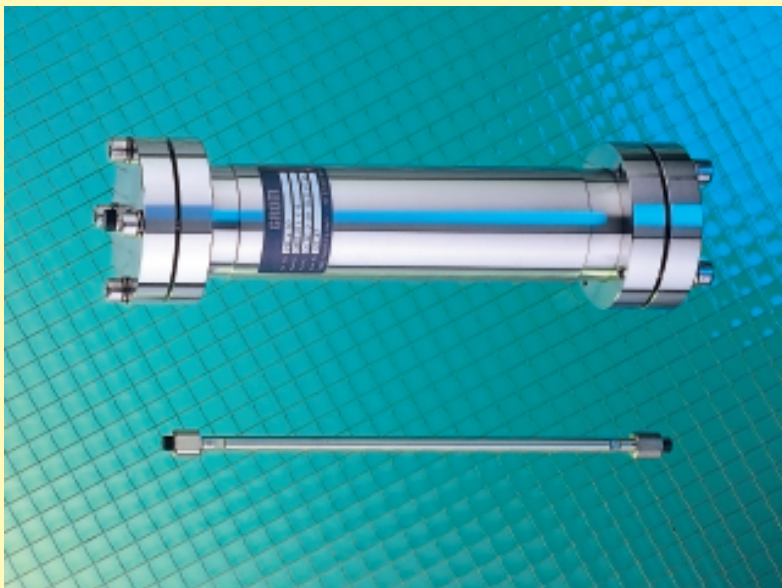


UP-set with 250 x 4 mm analytical column and 250 x 20 mm preparative column

UP- sets, consisting of  
one analytical column - 250 x 4 mm  
one preparative column - 250 x 20 mm (or 40 mm, respectively)  
and with the following packings are available from stock:

GROM-SIL 120 ODS-4 HE, 10 µm	Order No. GS OD4 1112 U 25 20
	Resp. GS OD4 1112 U 25 40
GROM Sapphire 110 C8, 10 µm	Order No. GS OCS 1011 U 25 20
	Resp. GS OCS 1011 U 25 40
GROM-SIL 120 Si NP-2, 10 µm	Order No. GS NP2 1112 U 25 20
	Resp. GS NP2 1112 U 25 40

UP-sets with other stationary phases or with columns of other dimensions upon request.



UP- set with 250 x 4 mm analytical column and 250 x 40 mm preparative column.

# GROM-SIL - optimal bulk materials in optimal column hardware for preparative HPLC

For preparative HPLC, a wide range of **GROM-SIL** phases (see overview table pages 12/13) is available as bulk material in quantities of 100g, 500g, and 1kg. (Larger quantities are available on request).  
GROM-SIL phases are characterised not only by high chemical selectivity, but also by their excellent physical

properties: they are absolutely spherical, fully porous and are of high specific surface area. As a consequence, GROM-SIL-packed columns show superior flow characteristics (e.g., low back pressure) and high efficiency (i.e., high plate number) and remarkable peak symmetry.

Phase type	Pore diameter	Particle size						
		10 µm	12 µm	15 µm	20 µm	40 µm	50 µm	150 µm
<b>C 18</b>	65 Å	Sapphire		Sapphire	Sapphire	Sapphire		
	100 Å	ODS-2 FE	ODS-2 FE	ODS-2 FE				
	110 Å	Sapphire		Sapphire	Sapphire	Sapphire		
	120 Å	ODS-3 CP		ODS-3 CP	ODS-3 CP			
		ODS-4 HE	ODS-4 HE	ODS-4 HE	ODS-4 HE	ODS-4 HE	ODS-4 HE	ODS-4 HE*
	200 Å	ODS-5 ST		ODS-5 ST	ODS-5 ST	ODS-5 ST	ODS-5 ST	ODS-5 ST*
		ODS-4 HE		ODS-4 HE	ODS-4 HE	ODS-4 HE*	ODS-4 HE	
	300 Å	ODS-5 ST		ODS-5 ST	ODS-5 ST	ODS-5 ST	ODS-5 ST	ODS-5 ST*
		ODS-2 FE	ODS-2 FE	ODS-2 FE				
	500 Å		ODS-2 FE					
<b>C8</b>	65 Å	Sapphire		Sapphire	Sapphire	Sapphire		
	100 Å	Octyl-4 FE	Octyl-4 FE	Octyl-4 FE				
	110 Å	Sapphire		Sapphire	Sapphire	Sapphire		
	120 Å	Octyl-6 MB		Octyl-6 MB	Octyl-6 MB	Octyl-6 MB	Octyl-6 MB	
	200 Å	Octyl-6 MB		Octyl-6 MB	Octyl-6 MB	Octyl-6 MB	Octyl-6 MB	
	300 Å			Octyl-4 FE*				
		Octyl-6 MB		Octyl-6 MB	Octyl-6 MB	Octyl-6 MB	Octyl-6 MB	
	500 Å		Octyl-4 FE*					
<b>Phenyl</b>	120 Å	Phenyl-1 FE		Phenyl-1 FE	Phenyl-1 FE			
	200 Å			Phenyl-1 FE*				
	300 Å	Phenyl-1 FE*		Phenyl-1 FE				
<b>C4</b>	65 Å	Sapphire		Sapphire	Sapphire	Sapphire		
	110 Å	Sapphire		Sapphire	Sapphire	Sapphire		
	120 Å	Butyl-1 ST		Butyl-1 ST	Butyl-1 ST	Butyl-1 ST	Butyl-1 ST	Butyl-1 ST
	200 Å	Butyl-1 ST		Butyl-1 ST	Butyl-1 ST	Butyl-1 ST	Butyl-1 ST	Butyl-1 ST
	300 Å	Butyl-1 ST		Butyl-1 ST	Butyl-1 ST	Butyl-1 ST	Butyl-1 ST	Butyl-1 ST
	500 Å			Butyl 2 FE*				
<b>C1</b>	120 Å	TMS-1 ST		TMS-1 ST	TMS-1 ST	TMS-1 ST	TMS-1 ST	
	200 Å	TMS-1 ST*		TMS-1 ST*	TMS-1 ST*			
	300 Å	TMS-1 ST*		TMS-1 ST	TMS-1 ST			
<b>Si</b>	65 Å	Sapphire		Sapphire	Sapphire	Sapphire		
	100 Å	Norm Ph-1 ST	Norm Ph-1 ST	Norm Ph-1 ST				
	110 Å	Sapphire		Sapphire	Sapphire	Sapphire		
	120 Å	Norm Ph-2 SP		Norm Ph-2 SP	Norm Ph-2 SP	Norm Ph-2 SP	Norm Ph-2 SP	Norm Ph-2 SP
	200 Å	Norm Ph-2 SP		Norm Ph-2 SP	Norm Ph-2 SP	Norm Ph-2 SP	Norm Ph-2 SP	Norm Ph-2 SP
	300 Å	Norm Ph-2 SP		Norm Ph-2 SP	Norm Ph-2 SP	Norm Ph-2 SP	Norm Ph-2 SP	
	500 Å			Norm Ph-1 ST				
	1000 Å	Norm Ph-2 SP		Norm Ph-2 SP				

\* These phases are available only in amounts of  $\geq$  1kg.

Upon request, further stationary phases (see overview-table pages 12/13 and 144) are also available (minimum quantity 1kg).

# Activated Agarose Gels for Affinity Chromatography

## Novarose™ Act<sup>High</sup> and Novarose™ Act<sub>Low</sub>

The *Novarose*™ series of activated gels are based on cross-linked agarose beads activated according to a new method [1]. *Novarose*™ Act<sup>High</sup> and *Novarose*™ Act<sub>Low</sub> are the perfect choice for easy and reliable immobilization of ligands.

- Ready for immediate use
- Simple coupling procedures at room temperature
- Stable at room temperature in aqueous solution and at neutral pH
- High flexibility; three pore sizes, each with two degrees of substitution
- High flow rate
- Coupling of ligands containing sulfhydryl, amino or hydroxyl groups



### Novarose Act Gels

The *Novarose* cross-linked agarose beads are activated according to the bromohydrine method. This activation method is based upon well-known chemistry which allows the coupling to be performed in aqueous solutions.

*Novarose Act* is supplied as an aqueous suspension. After washing, the gel is immediately ready for use. Since no toxic chemicals are involved and the *Novarose* products are stable at room temperature, the coupling procedure can, as long as the application allows, easily be performed at the bench at ambient temperature.

The cross-linked, spherical *Novarose Size Exclusion* media are used as starting material for the activated gels. They are available in different particle and pore sizes. Agarose beads are normally too soft for modern high performance methods, but, due to a new, patented cross-linking method, *Novarose SE* beads are rigid and therefore ideal for all modern chromatography techniques. A spacer of 4 to 16 C-atoms separates the ligand from the *Novarose* bead.

Being a cross-linked agarose matrix, *Novarose Act* pos-

sesses most of the characteristics of an extraordinary, *ideal matrix* for *affinity chromatography* (2). To make it easy to find the right gel for each application, *Novarose Act* is available with **three different pore sizes**, each with **two degrees of substitution**.

*Novarose Act* is a simple matrix for convenient immobilization of ligands. It is very easy to use and offers high flexibility and high performance. The gels can be stored at room temperature for one year in aqueous solution at pH 7 (containing ~20 % methanol as preservative) without any significant decrease in coupling activity.

### Application Areas

*Novarose*™ Act *High* and *Novarose*™ Act *Low* are tailor-made for purification of biomolecules using different chromatographic techniques – *IEX*, *HIC*, *IMAC* or *affinity chromatography* – after coupling with a suitable ligand. As mentioned, they are the perfect gels for easy and reliable immobilization of ligands containing sulfhydryl, amino or hydroxyl groups.

### Product Specifications

Novarose Product	Exclusion [kD]	Bead Size [µm]	Max. Flow [cm/min]	Degree of Substitution [mol/mol]	Group to be coupled	Field of Applications
Nov.Act <sub>Low</sub> 100/40	ca. 200	32–60	15	0.10–0.20	-SH, -NH <sub>2</sub> , -OH	peptides
Nov.Act <sup>High</sup> 100/40	ca. 200	32–60	15	0.65–0.75	-SH, -NH <sub>2</sub> , -OH	peptides
Nov.Act <sub>Low</sub> 1 000/40	ca. 1 500	32–60	15	0.10–0.20	-SH, -NH <sub>2</sub> , -OH	peptides/proteins
Nov.Act <sup>High</sup> 1 000/40	ca. 1 500	32–60	15	0.60–0.70	-SH, -NH <sub>2</sub> , -OH	peptides/proteins
Nov.Act <sub>Low</sub> 10 000/40	> 10 000	32–60	15	0.10–0.20	-SH, -NH <sub>2</sub> , -OH	proteins
Nov.Act <sup>High</sup> 10 000/40	> 10 000	32–60	15	0.45–0.55	-SH, -NH <sub>2</sub> , -OH	proteins

# Chelating High Performance Agarose for Immobilised Affinity Chromatography

**Novarose™ IDA<sup>High</sup>, Novarose™ IDA<sub>Low</sub>, Novarose™ TREN<sup>High</sup>, Novarose™ TREN<sub>Low</sub>, Novarose™ DPA<sup>High</sup> and Novarose™ DPA<sub>Low</sub>**

The Novarose™ series of immobilized affinity chromatography (IMAC) gels are cross-linked agarose beads activated and coupled according to the bromohydrine method [1]. This method gives rise to a spacer arm of 4 to 16 atoms length between the agarose backbone and the attached chelator.

- **Ready for immediate use**
- **High flexibility; three pore sizes, each with two reactive ligand densities**
- **High flow rates**
- **Easy to pack in specially designed columns**

Novarose gels are supplied in aqueous suspensions with ethanol as a preservative and are immediately ready for use after washing.

The ligand density has been shown to have a great impact on the separation (3, 4). In some cases, a high capacity gel is needed, while in other cases a low capacity gel may solve the problem. *Novarose IMAC* gels are available in three pore sizes and two degrees of substitution, low and high, to allow maximum flexibility when selecting the optimal IMAC conditions. Furthermore, if there is a need for other capacities, the *Novarose IMAC* series may be mixed to obtain any capacity between the specified limits in a simple and reproducible way.

## Chelating Groups

There are three different chelators attached to *Novarose* gels: the well known **iminodiacetic acid (IDA)** and two new chelators, namely **tris-(2-ethylaminoethyl) amine (TREN) and dipicolyl amine (DPA)**. These chelators exhibit different interactions with metal ions and consequently show different adsorption/desorption properties towards the solute molecule.

## Application Areas

*Novarose IMAC* gels are designed for purification of bio-molecules using immobilized metal ions. This technique is

## Product Specifications

Novarose Product*	Exclusion Limit [kD]	Bead Size [µm]	Max. Flow [cm/min]	Mequ. Capacity [µeqv. Cu <sup>2+</sup> /ml gel]
Novarose IDA <sub>Low</sub> 100 / 40	ca. 200	32–60	15	10–20
Novarose IDA <sup>High</sup> 100 / 40	ca. 200	32–60	15	50–60
Novarose IDA <sub>Low</sub> 1 000 / 40	ca. 1 500	32–60	10	10–20
Novarose IDA <sup>High</sup> 1 000 / 40	ca. 1 500	32–60	10	50–60
Novarose IDA <sub>Low</sub> 10 000 / 40	> 10 000	32–60	10	10–20
Novarose IDA <sup>High</sup> 10 000 / 40	> 10 000	32–60	10	40–50
Novarose TREN <sub>Low</sub> 100 / 40	ca. 200	32–60	15	10–20
Novarose TREN <sup>High</sup> 100 / 40	ca. 200	32–60	15	50–60
Novarose TREN <sub>Low</sub> 1 000 / 40	ca. 1 500	32–60	10	10–20
Novarose TREN <sup>High</sup> 1 000 / 40	ca. 1 500	32–60	10	50–60
Novarose TREN <sub>Low</sub> 10 000 / 40	> 10 000	32–60	10	10–20
Novarose TREN <sup>High</sup> 10 000 / 40	> 10 000	32–60	10	40–50
Novarose DPA <sub>Low</sub> 100 / 40	ca. 200	32–60	15	10–20
Novarose DPA <sup>High</sup> 100 / 40	ca. 200	32–60	15	50–60
Novarose DPA <sub>Low</sub> 1 000 / 40	ca. 1 500	32–60	10	10–20
Novarose DPA <sup>High</sup> 1 000 / 40	ca. 1 500	32–60	10	40–50
Novarose DPA <sub>Low</sub> 10 000 / 40	> 10 000	32–60	10	10–20
Novarose DPA <sup>High</sup> 10 000 / 40	> 10 000	32–60	10	35–45

\* pack size 25 ml, 150 ml and 500 ml

well-known, having been established in 1975 and the interest in its applications has grown rapidly during the last years. Typically, biomolecules (proteins, polypeptides and peptides) containing one or several exposed **histidines** interact strongly with certain metal ions. **Tryptophan** and **cysteine** have also been shown to interact under some conditions. IMAC gels have also been used quite successfully to fractionate nucleic acids and to separate cells.

### Metal Ions and Loading

Most frequently, the following metal ions have been used for IMAC:  $Zn^{2+}$ ,  $Cu^{2+}$ ,  $Ni^{2+}$ ,  $Fe^{3+}$ ,  $Co^{2+}$ ,  $Ca^{2+}$  and  $Al^{3+}$ . But, in principle, any metal ion which interacts with the protein of interest may be used. It should be noted that the total binding capacity for the different gels is always specified only for  $Cu^{2+}$  (see table page 139) and will vary slightly for other metal ions.

### Adsorption and Desorption

Chromatography conditions vary, of course, with the separation problem. While adsorption solvents are usually

aqueous, organic solvents in low concentrations can also be used. Depending on the nature of the chelator, both electrostatic and hydrophobic interaction may be involved and care has to be exercised with respect to the ionic strength of the buffer. Buffers possessing moieties with appreciable affinities for the metal ions are generally avoided in IMAC.

Protein desorption is done either by altering of the pH or by competition for the metal binding sites between the protein and another compound like ammonium salts or imidazole buffer.

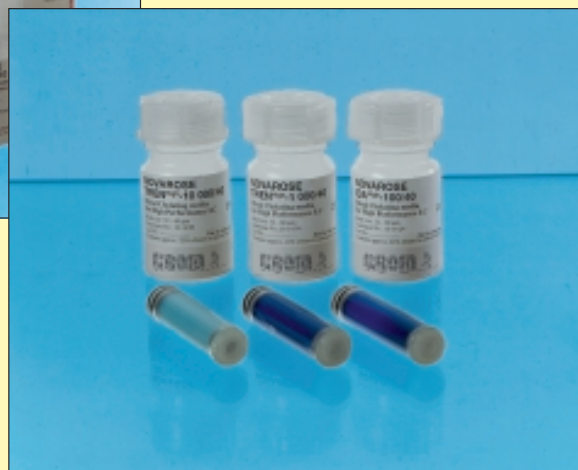
### Storage and Removal of the Metal Ions

**Novarose IMAC** gels are supplied as aqueous suspensions containing 22 % ethanol as a preservative. They can be stored at room temperature. However, to prevent bacterial growth, it is recommended to add ethanol or sodium azide if stored in buffer.

Many metal ions undergo redox reactions and this may cause deviations in the properties of the gel during long-term storage. If the gel is not to be used for a long time, it is recommended that the metal ions be removed. This can easily be done with a solution of ethylenediamine tetraacetic acid (EDTA).

### References

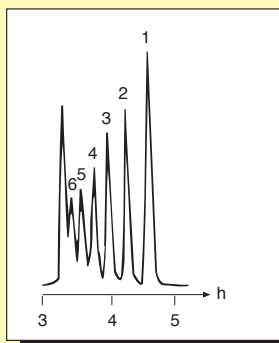
1. Patent SE 91 02 211 - 1, Inovata AB
2. G. T. Hermansson, A. K. Mallia and P. K. Smith, „Immobilized Affinity Ligand Techniques“, Academic Press Inc., 1992
3. Inovata Application, No. 305 (*will be supplied upon request by GROM GmbH*)
4. J. J. Winzerling et al., „How to use immobilized metal ion affinity chromatography“, A Companion to Methods in Enzymology 4, 4–13, 1992



# Gel Permeation, Size Exclusion Chromatography (SEC)

Employing Toyopearl Resins packed in the unique **NovoGROM** column hardware

... as described on pages 120 and 121



Toyopearl HW size exclusion chromatography (SEC) resins are macroporous packings dedicated to the separation of large biopolymers such as proteins, nucleic acids, etc. They are also appropriate for molecular weight determination. These resins are semi-rigid, spherical beads with a hydrophilic surface. They are synthesized by co-polymerisation of ethylene glycol and methacrylate-type polymers. There are five types of Toyopearl HW resins available, i.e., HW-40, HW-50, HW-55, HW-65 and HW-75. As easily can be concluded from figure and table, each of these is defined by a given molecular size separation range. They span peptide and protein molecular weights, from 100 to 50,000,000 Daltons depending on resin type.

## Separation of $\beta$ -cyclodextrin hydrolysate

**Experimental conditions:** column: Toyopearl HW-40S, 600 x 22 mm (2x in series); sample: 500  $\mu$ l 5% (wt) hydrolyzed  $\beta$ -cyclodextrin: 1) glucose, 2) maltose, 3) maltotriose, 4) maltotetraose, 5) maltopentaose, 6) maltohexaose, eluent: distilled water; flow rate: 1.0 ml / min; temperature: 40°C; detection: RI

## Properties and Molecular Weight Separation Ranges

Toyopearl Resin	Particle Size [ $\mu$ m]	Pore Size [Å]	Polyethylene Glycols/Oxides [Dalton]	Dextrans [Dalton]	Globular Proteins [Dalton]
HW-40S	20–40	50	100 – 3 000	100 – 7 000	100 – 10 000
HW-40F	30–60				
HW-40C	50–100				
HW-50S	20–40	125	100 – 18 000	500 – 20 000	500 – 80 000
HW-50F	30–60				
HW-55S	20–40	300	100 – 150 000	1 000 – 200 000	1 000 – 700 000
HW-55F	30–60				
HW-65S	20–40	1 000	500 – 1 000 000	10 000 – 1 000 000	40 000 – 5 000 000
HW-65F	30–60				
HW-75F	30–60	>1 000	4 000 – 5 000 000	100 000 – 10 000 000	500 000 – 50 000 000

S, superfine; F, fine; C, coarse

# Hydrophobic Interaction Chromatography (HIC)

... a powerful tool for biochemical applications

Toyopearl HW-65 resins, rather well-accepted for size exclusion chromatography, are an excellent base matrix for the Toyopearl 650 series of hydrophobic interaction resins. The hydrophobicity of these packings increases through the series: Ether-, Butyl-, Phenyl. They provide outstanding performance when packed in the unique **NovoGROM** columns ...

## Toyopearl Hydrophobic Interaction Chromatography Resins, typical properties

Toyopearl Resin	Particle Size [ $\mu$ m]	Exclusion Limit [Daltons]	Mass Recovery		Adsorption Capacity [mg/ml]
			Lysozyme [%]	Ovalbumin [%]	
Ether-650S	20–50	1 x 10 <sup>6</sup>	94	83	10–30
Ether-650M	40–90	1 x 10 <sup>6</sup>	94	94	10–30
Butyl-650S	20–50	1 x 10 <sup>6</sup>	85	73	30–50
Butyl-650M	40–90	1 x 10 <sup>6</sup>	85	73	30–50
Butyl-650C	50–150	6 x 10 <sup>6</sup>	85	73	30–50
Phenyl-650S	20–50	1 x 10 <sup>6</sup>	92	88	30–50
Phenyl-650M	40–90	1 x 10 <sup>6</sup>	92	88	30–50
Phenyl-650C	50–150	6 x 10 <sup>6</sup>	92	88	30–50

S, superfine; M, medium; C, coarse

# Toyopearl Ion Exchange Chromatography (IEC)

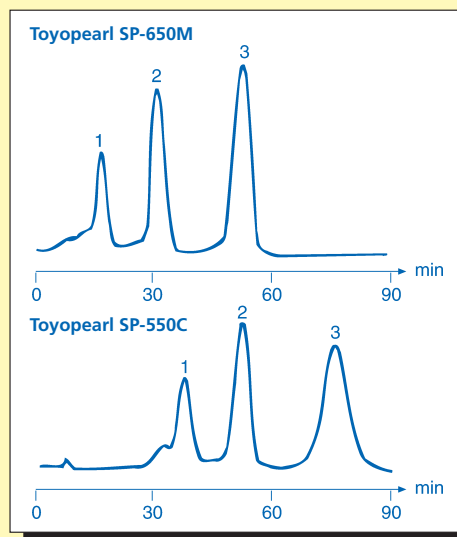
Packed in unique **NovoGROM** column hardware

... as described on pages 120 and 121







The numerous surface hydroxyl groups of the **Toyopearl HW-55**, and **HW-65** resins, which have been well-proven in size exclusion chromatography, provide excellent attachment points for other functional groups and ligands. Thus, these resins are used as the principal base matrix for the **Toyopearl 550** and **650** series of ion exchange resins. The Toyopearl 550 series of IEC resins is designed to enable high volume sample throughput, whereas Toyopearl 650 series provides the high resolution required during the mid to final stages of a purification process. They have an estimated globular protein exclusion limit of 700000 and 5000000 Daltons respectively. All Toyopearl ion exchangers are chemically and thermally stable due to their polymeric backbone. They can be used from pH 3.0 to pH 10.5. Caustic or acidic solutions can also be applied for sanitation (e.g., 1 % sodium hypochlorite) and depyrogenation. Furthermore, in some cases, overnight cleaning or sterilisation procedures with strong acid or base are acceptable, for instance with Toyopearl DEAE-650.

## Comparison of resolution by strong cation exchangers

**Experimental conditions:** column: 100 x 15 mm; sample: 1) ribonuclease A, 2) cytochrome C, 3) lysozyme; elution: linear gradient (within 60 min) 0 → 0.5 M NaCl in 0.02 M Na-phosphate pH 7.0; flow rate: 1.1 ml/min; UV detection: 280 nm



## Toyopearl Ion Exchange Resins, typical properties

Toyopearl Resin	Functional Group	Particle Size [µm]	Ion Exchange Capacity [meq/ml]	Adsorption Capacity [mg/ml]	Exclusion Limit [Daltons]	Pressure Drop [bar]
CM-650S CM-650M CM-650C	 -O-CH <sub>2</sub> -COOH weak cation exchanger	20–50 40–90 50–150	0.08–0.12 0.08–0.12 0.05–0.11	40–60 40–60 35–55	1 x 10 <sup>6</sup> 1 x 10 <sup>6</sup> 6 x 10 <sup>5</sup>	max. 0.4 max. 0.2 max. 0.15
SP-650S SP-650M SP-650C	 -O-CH <sub>2</sub> -CH <sub>2</sub> -CH <sub>2</sub> -SO <sub>3</sub> strong cation exchanger	20–50 40–90 50–150	0.13–0.17 0.13–0.17 0.12–0.18	40–60 40–60 35–55	1 x 10 <sup>6</sup> 1 x 10 <sup>6</sup> 6 x 10 <sup>5</sup>	max. 0.5 max. 0.2 max. 0.15
DEAE-650S DEAE-650M DEAE-650C	 -O-CH <sub>2</sub> -CH <sub>2</sub> -N-(C <sub>2</sub> H <sub>5</sub> ) <sub>2</sub> anion exchanger	20–50 40–90 50–150	0.08–0.12 0.08–0.12 0.05–0.11	25–35 25–35 25–35	1 x 10 <sup>6</sup> 1 x 10 <sup>6</sup> 6 x 10 <sup>5</sup>	max. 0.4 max. 0.2 max. 0.2
QAE-550C	 -O-R'-N <sup>+</sup> -(R) <sub>3</sub> strong anion exchanger	50–150	0.28–0.38	60–80	5 x 10 <sup>5</sup>	max. 0.15
Super Q -650S Super Q -650M Super Q -650C	 -O-R'-N <sup>+</sup> -(R) <sub>3</sub> strong anion exchanger	20–50 40–90 50–150	0.20–0.30 0.20–0.30 0.20–0.30	105–155 105–155 105–155	– – –	max. 0.4 max. 0.2 max. 0.15
SP-550C	 -O-CH <sub>2</sub> -CH <sub>2</sub> -CH <sub>2</sub> -SO <sub>3</sub> strong cation exchanger	50–150	0.14–0.18	80–120	5 x 10 <sup>5</sup>	max. 0.15

S, superfine; M, medium; C, coarse

**Conditions:** Exclusion Limits are +/- 30 % and were determined using polyethylene glycol, polyethylene oxide or dextran standards, as appropriate. Pressure drop has been determined in a 600 x 22 mm column at 1.0 ml/min using 0.1 M NaCl as eluent. Samples used to determine adsorption capacity were: CM-650, hemoglobin; SP-650, lysozyme; DEAE-650, bovine serum albumin.

# TSK-GEL 5PW Preparative LC Resins packed in **NovoGROM** columns

## The ultimate alternative to preparative HPLC

TSK-GEL 5PW Preparative LC Resins are most often used for up-scaling in biopharmaceutical applications. The TSKgel DEAE-5PW and TSK-gel SP-5PW resins permit high resolution in ion exchange chromatography, whereas the outstanding, TSKgel Phenyl-5PW and TSKgel Ether-5PW resins are used for up-scaling in hydrophobic interaction chromatography. They have a particle size of 30  $\mu\text{m}$ . All are made from the same hydrophilic G5000 PW- polymer and guarantee excellent preparative separations, especially when packed in the unique **NovoGROM** columns (s. pages 120 and 121).

Table 10 TSK-GEL Preparative PW Resins for Ion Exchange Chromatography

TSK-GEL Resin	Particle Size [ $\mu\text{m}$ ]	Exclusion Limit [Daltons]	Adsorption Capacity [mg/ml]
SP-5PW	20–40	5 000 000 (globular proteins)	20–40 (lysozyme)
DEAE-5PW	20–40	5 000 000 (globular proteins)	20–40 (bovine serum albumin)

## TSK-GEL Preparative PW Resins for Hydrophobic Interaction Chromatography

TSK-GEL Resin	Particle Size [ $\mu\text{m}$ ]	Exclusion Limit [Daltons]	Adsorption Capacity [mg/ml]
Ether-5PW	20–40	$9 \times 10^5$ (polyethylene glycol)	20–40 (lysozyme)
Phenyl-5PW	20–40	$9 \times 10^5$ (polyethylene glycol)	20–40 (lysozyme)

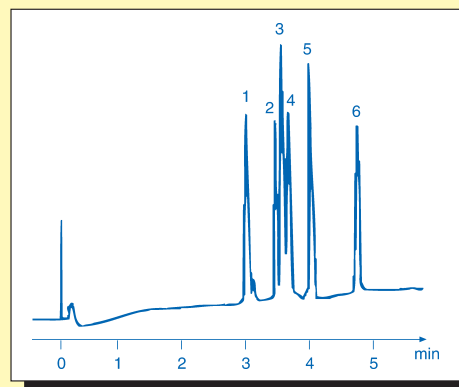
The huge variety of **NovoGROM** HPLC columns is offered packed with

## Resin-based TSK-GEL reversed phases

They provide maximum selectivity and resolution for a wide range of peptides and proteins. The hydrophilic backbone of these TSKgel reversed phase packings guarantees unsurpassed chemical and physical stability for longer column life. Several problems inherent to silica based packings, such as a lack of pH stability or secondary interactions due to exposed silanol groups, are eliminated when columns are packed with TSKgel reversed phase resins.

### Rapid peptide separation on TSK-gel Octadecyl-NPR

**Experimental conditions:** column: TSK-gel Octadecyl-NPR, 4.6 x 35 mm; eluent / gradient: 10 min linear from 0 % to 80 % ACN in 0.2 % TFA; flow rate: 1.5 ml / min; temperature: ambient; detection: UV, 220 nm; sample: 1)  $\alpha$ -endorphin, 2) bombesin, 3)  $\gamma$ -endorphin, 4) angiotensin, 5) somatostatin, 6) calcitonin

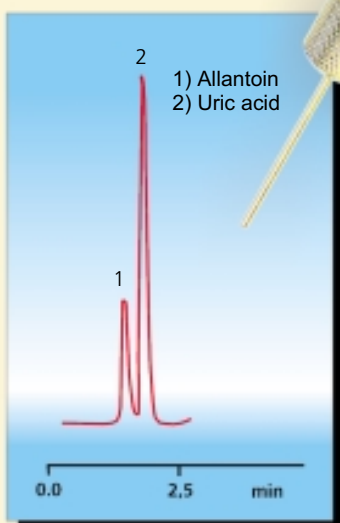
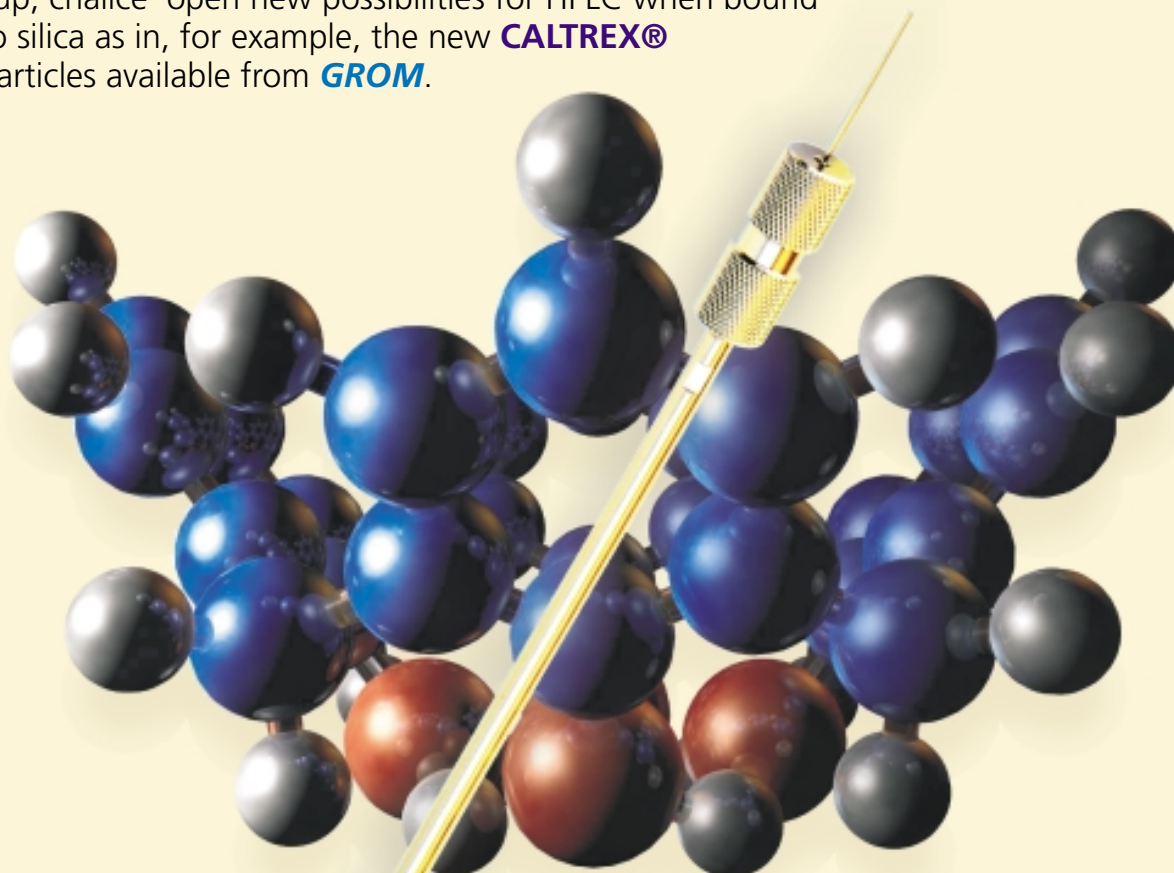


## Resin-based TSK-gel reversed phase packings, typical properties

Toyopearl Resin	Functional Group	Particle Size [ $\mu\text{m}$ ]	Pore Size [Å]	Ligand Density [meq/ml]	Linear Flow [cm/min]	Max. Pressure [MPa]
Phenyl-5PW RP	phenyl, monomeric	10	1 000	1	3.0–6.0	3.0
		13	1 000	1	1.6–2.2	3.0
		20	1 000	1	—	—
Octadecyl-4PW	C18 alkyl, monomeric	7	500	1	3.0–6.0	1.2
		13	500	1	0.8–1.6	3.5
Octadecyl-NPR	C18 alkyl, monomeric	2.5	nonporous	1	6.0–9.0	20.0

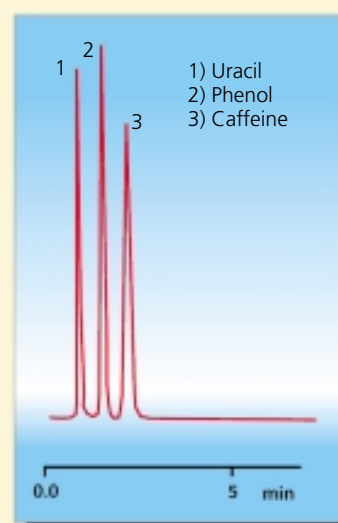
# Novel, unique Calixarene HPLC packings from SYNAPTEC

**Calixarenes** are cyclic condensation products of para-substituted phenols and formaldehyde. These cuplike molecules Calix (Greek kalyx) = cup, chalice open new possibilities for HPLC when bound to silica as in, for example, the new **CALTREX®** particles available from **GROM**.



**Column phase:** CALTRES HS, 5  $\mu\text{m}$   
**Column size:** 125 x 4 mm  
**Eluent:** H<sub>2</sub>O / ACN = 95 / 5  
**Flow rate:** 1.0 mL / min  
**Temperature:** 25°C  
**Detection (UV):** 254 nm

**Column phase:** CALTRES HS, 5  $\mu\text{m}$   
**Column size:** 125 x 3 mm  
**Eluent:** 2.5 mM K-Phosphate, pH 3.0 / ACN = 95 / 5  
**Flow rate:** 0.7 mL / min  
**Temperature:** 25°C  
**Detection (UV):** 220 nm



High speed columns packed with **CALTREX®** particles unite two desirable properties, namely rapid separations and the resolution of difficult separation problems, into a single product. Efficient and rapid separations are absolute requirements for many applications, for example, in screening for new compounds in the pharmaceutical industry.

## ..... in the Service of Science

### GROM services, prompt and quickly responding

#### GROM Column-packing service.

**GROM** has established a long-standing reputation for highest quality and reliability in the field of column packing. In the **GROM** laboratories, the majority of the stationary phases available world-wide, in particular those from all recognized manufacturers (see table below), are expertly packed in the unique **NovoGROM** column hardware. On request, **GROM** will also pack columns with stationary phases supplied by the customer.

All these stationary phases, plus each of the **GROM Sil** phases (listed on pages 12 / 13) are routinely packed by the **GROM** column packing service:

Trade name/ Manufacturer	Stationary phase type																			
	C18	C18B	PS/DVB	C8	C8B	C6	Phenyl	C4	C1	Nitrile	Amino	Nitro	Diol	SAX/SB	SCX/SA	WAX	WCX	Si	Chiral	
AGP Chromtech																				●
u-Bondapak Waters	●						●			●	●								●	
Capcell Shiseido	●			●			●		●	●	●									
Eurospher Knauer	●			●					●		●		●	●	●				●	
GROM-SIL Grom	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●
Hypersil Thermo Quest	●	●		●	●		●	●	●	●	●			●					●	
Intersil GI-Science	●			●			●												●	
Kromasil Eka-Nobel	●			●				●	●										●	
LiChrosorb Merck	●			●					●	●	●		●						●	
LiChrospher Merck	●			●	●					●	●		●						●	
Nucleosil Machery-Nagel	●	●		●			●		●	●	●	●	●	●	●				●	
Partisil Whatman	●			●						●	●			●	●				●	
Polygosil Machery-Nagel	●			●							●	●	●						●	
PRP Hamilton			●											●	●					
Purospher Merck	●																			
Spherisorb Waters	●	●		●		●	●	●	●	●	●			●	●				●	
Superspher Merck	●			●																
Synchropak Micra Scientific	●			●				●	●				●	●	●	●	●	●	●	
Vydac The Separations Group	●			●				●	●											
YMC YMC	●	●		●	●		●	●	●	●	●			●					●	
Zorbax Agilent Technologies	●	●		●	●		●	●	●	●	●			●	●				●	

#### GROM Column-refill service

The routine short delivery time of 24 - 48 hours applies in particular to the **GROM** column-refill service. On request, column hardware from other manufacturers can also be refilled with the above listed stationary phases. This economical refilling service is available for microbore, analytical and preparative columns.

#### GROM Preparative-service

Preparative chromatographic purifications of customers products, including chiral separations, on a mg up to gram scale are offered by the reliable and prompt **GROM** preparative-service. Detailed information available on request.

for analytical and preparative

## High Performance Liquid Chromatography

The palette of **GROM** packed HPLC columns ranges from 100 µm capillaries of 5 mm length to 10 cm diameter preparative columns with a length of 100 cm.

**NovoGROM** capillaries, microbore and analytical columns in the standard dimensions (200, 300, 500 and 800 µm, 1, 2, 3, 4 and 4.6 mm i.d.) packed with any of the stationary phases listed below are available from stock. Orders for HPLC columns are routinely shipped within 48 hours.

### NovoGROM HPLC columns ..... huge variety of standard column dimensions

	Length	Inner diameter (mm)																		
		<0,3	0,3	0,5	0,8	1	2	3	4	4,6	8	10	16	20	30	40	50	60	75	100
guard column- *cartridges	5		◆	◆	◆	◆	◆	◆	◆											
	10		◆	◆	◆	◆	◆	◆	◆	◆	◆			◆						
	20		◆	◆	◆	◆	◆	◆	◆	◆	◆			◆	◆					
	30														◆					
	40								◆	◆										
	50																			
columns and cartridges	20					◆	◆	◆	◆	◆					◆					
	25																			
	30		◆	◆	◆	◆	◆	◆	◆	◆			◆	◆	◆					
	40	◆	◆	◆	◆	◆	◆	◆	◆	◆			◆	◆	◆	◆				
	50	◆	◆	◆	◆	◆	◆	◆	◆	◆			◆	◆	◆	◆	◆		◆	◆
	60	◆	◆	◆	◆	◆	◆	◆	◆	◆			◆	◆	◆	◆	◆			
	75	◆	◆	◆	◆	◆	◆	◆	◆	◆			◆	◆	◆	◆	◆			
	100	◆	◆	◆	◆	◆	◆	◆	◆	◆			◆	◆	◆	◆	◆			
	125	◆	◆	◆	◆	◆	◆	◆	◆	◆			◆	◆	◆	◆	◆		◆	◆
	150	◆	◆	◆	◆	◆	◆	◆	◆	◆			◆	◆	◆	◆	◆			
	200	◆	◆	◆	◆	◆	◆	◆	◆	◆			◆	◆	◆	◆	◆		◆	◆
	250	◆	◆	◆	◆	◆	◆	◆	◆	◆			◆	◆	◆	◆	◆		◆	◆
	300	◆	◆	◆	◆	◆	◆	◆	◆	◆			◆	◆	◆	◆	◆		◆	◆
	500					◆	◆	◆	◆	◆			◆	◆	◆	◆	◆		◆	◆
1000										◆	◆		◆	◆	◆	◆		◆	◆	

\*guard column head or holder required.

### Custom analysis service (Environmental, biopharmaceutical and drug analysis)

#### Environmental analysis

We offer the following environmental analyses:

##### Matrix:

Drinking water, industrial water, waste water, ground water, soil, sludges, core samples.

- 6 PAH's (old TVO protocoll)
- 16 PAH's (new TVO protocoll)
- Anions
- Cations
- Organic acids
- Atrazine and related pesticides
- Phenols, halophenols and nitrophenols
- Carbamate pesticides and herbicides
- Urea-based pesticides and herbicides

We also offer a customized method development service for all types of samples. Please inquire.

#### Biopharmacy

The following biopharmaceutical analyses are offered:

##### Matrix:

Whole blood, serum, plasma, urine, lacrimal fluid, saliva, seminal fluid, vaginal secretions, organ and tissue samples, bone, cell cultures, skin permeates, erythrocytes, microsomes, etc., from both human and animal sources.

- Validated methods for approx. 300 drugs (German Red List of Pharmaceuticals)
- Custom method development for specific samples
- Adaptation of customer's methods to routine methods
- Enantiospecific separation of drugs
- Analysis of drug metabolites
- Determination of drug-concentration levels in samples from patients
- Bioavailability of phytopharmaceuticals
- Determination of anions and cations in human and animal samples
- Determination of phenols, PAH's, CHC's and PC
- Isolation of metabolites from plasma or urine on a preparative scale

#### Pharmaceutical analysis

We offer the following pharmaceutical analyses:

- Analyses according to DAB 9, DAC 1986, HAB 1 and other pharmacopoeas
- Method development and validation of customer-specific analyses
- Adaptation of customer's methods to routine methods
- Determination of the enantiomeric composition of racemates
- Isolation and identification of drug metabolites
- Method development for analysis of phytopharmaceuticals
- Isolation and identification of phytopharmaceuticals
- Development and improvement of galenic preparations
- Stability analysis
- Editing of drug approval applications

**Note!**

Due to safety regulations we are not authorized to accept shipments of any viral- or radioactive contaminated sample.

# Other Tradenames and Manufacturers

of well accepted Stationary Phases for HPLC

<b>Adsorbosphere</b>	Alltech	<b>Kovasil</b>	Uetikon
<b>Alltima</b>	Alltech	<b>Luna</b>	Phenomenex
<b>Aminex</b>	Biorad	<b>MCI</b>	Mitsubishi
<b>Apex</b>	Jones	<b>Microsorb</b>	Rainin
<b>Aquapore</b>	Brownlee / PE	<b>PartiSphere</b>	Whatman
<b>Aquasil</b>	Keystone	<b>Pecosphere</b>	Brownlee / PE
<b>Asahipak</b>	Shodex	<b>Pecosil</b>	Brownlee / PE
<b>Bakerbond</b>	Baker	<b>Phenogel</b>	Phenomenex
<b>BetaSil</b>	Keystone	<b>PhenoSphere</b>	Phenomenex
<b>Chiracel</b>	Daicel / Chiral Technologies	<b>Platinum</b>	Alltech
<b>Chiralpak</b>	Daicel / Chiral Technologies	<b>Plgel</b>	PolymerLab
<b>Chirobiotic V</b>	Astec	<b>PLRP-S</b>	PolymerLab
<b>Chromegabond</b>	E.S. Industries	<b>PolyEncap</b>	Bischoff
<b>Cosmosil</b>	Nacalai Tesque	<b>Prism</b>	Keystone
<b>Crownpak</b>	Daicel / Chiral Technologies	<b>Prodigy</b>	Phenomenex
<b>Cyclobond</b>	Astec	<b>Progel</b>	Supelco
<b>Deltabond</b>	Keystone	<b>ProntoSil</b>	Bischoff
<b>Deltapak</b>	Waters	<b>Protein-Pak</b>	Waters
<b>Develosil</b>	Nomura Chemical	<b>Resolve</b>	Waters
<b>Discovery</b>	Supelco	<b>Rexchrome</b>	Regis
<b>Dynamax</b>	Rainin	<b>Rezex</b>	Phenomenex
<b>Econosphere</b>	Alltech	<b>Coregel</b>	Sarasep
<b>Econosil</b>	Alltech	<b>Spheri</b>	Brownlee / PE
<b>Envirogel</b>	Waters	<b>Styragel</b>	Waters
<b>Genesis</b>	Jones	<b>Sumichiral</b>	Sumika Chemical
<b>HAIsil</b>	Higgins Analytical	<b>Supelcosil</b>	Supelco
<b>Hydropore</b>	Rainin	<b>Super ODS, Octyl</b>	TosoHaas
<b>Hypercarb</b>	Thermo Quest	<b>Suplex</b>	Supelco
<b>Hyperprep</b>	Thermo Quest	<b>TSK</b>	TosoHaas
<b>HyPurity Advance</b>	Thermo Quest	<b>Ultrasphere</b>	Beckmann Coulter
<b>HyPurity Elite</b>	Thermo Quest	<b>Ultremex</b>	Phenomenex
<b>Jordi</b>	Jordi	<b>Velosep</b>	Brownlee / PE
<b>Jupiter</b>	Phenomenex	<b>Versapak</b>	Alltech

**GROM**, a leader in filling and manufacturing HPLC columns, is a worldwide renowned expert, specialized in packing of **Microbore** and **Capillary Columns**.

## HPLC- packing materials from other manufacturers

In addition to **GROM** stationary phases, the **GROM column packing service** and **GROM** refill service also pack analytical and preparative columns with materials from other internationally renowned

manufacturers. On the following pages, we list our contract partners and the materials which we pack in either **NovoGROM** hardware or columns of other producers.

**μBondapak**<sup>®</sup> - Waters (Milford, MA, USA)

A well proven phase from the pioneer of HPLC manufacturers.

Packing material	Order no.	Particle size (μm)	Pore size (Å)
μBondapak C18	BS Od 1 .....*	10	120
μBondapak Phenyl	BS PH 1 .....*	10	120
μBondapak CN	BS CN 1 .....*	10	120
μBondapak NH <sub>2</sub>	BS NH 1 .....*	10	120
μBondapak Porasil (Si)	BS NP 1 .....*	10	120

\* Please add abbreviation (see pages 160 and 161) for particle size, pore diameter, column hardware type and column dimensions.

# Packing Materials

**µBondapak®** - Waters (Milford, MA, USA)

Packing material	Order no.	Particle size (µm)	Pore size (Å)
Nova-Pak C18	BS OD 5 .....*	4	60
Nova-Pak C8	BS OC 5 .....*	4	60
Nova-Pak CN	BS CN 5 .....*	4	60
Nova-Pak Phenyl	BS PH 5 .....*	4	60
Nova-Pak Si	BS NP 5 .....*	4	60
Symmetry C18	BS OD 3 .....*	3.5, 5	100
Symmetry Shield RP18	BS OD 4 .....*	3.5, 5	100
Symmetry300C18	BS OD 3 .....*	5	300
Symmetry C8	BS OC 2 .....*	3.5, 5	100
Symmetry Shield RP8	BS OC 3 .....*	3.5, 5	100
Symmetry300C8	BS OC 2 .....*	5	300
Symmetry300C4	BS BU 2 .....*	5	300

**Capcell PAK®** - Shiseido (Kyoto, J) Quality products from Far East

Packing material	Order no.	Particle size (µm)	Pore size (Å)
CAPCELL PAK SG C18	CS OD 1 .....*	3, 5	120, 300
CAPCELL PAK SG C8	CS OC 1 .....*	5	120, 300
CAPCELL PAK SG Phenyl	CS PH 1 .....*	5	120, 300
CAPCELL PAK SG C1	CS TM 1 .....*	5	120,300
CAPCELL PAK SG CN	CS CN 1 .....*	5	120
CAPCELL PAK SG NH <sub>2</sub>	CS NH 1 .....*	5	80
CAPCELL PAK AG C18	CS OD 2 .....*	5	120
CAPCELL PAK AG C8	CS OC 2 .....*	5	120
CAPCELL PAK UG C18	CS OD 3 .....*	3, 5	120, 300
CAPCELL PAK UG C8	CS OC 3 .....*	5	120
CAPCELL PAK UG Phenyl	CS PH 3 .....*	5	120
CAPCELL PAK UG C1	CS TM 3 .....*	5	120
CAPCELL PAK UG CN	CS CN 3 .....*	5	120
CAPCELL PAK UG NH <sub>2</sub>	CS NH 3 .....*	5	120

**Eurospher®** - Knauer (Berlin, FRG) Quality phases "Made in Germany"

Packing material	Order no.	Particle size (µm)	Pore size (Å)
Eurospher C18	ES OD 1 .....*	5, 7, 10	100
Eurospher C8	ES OC 1 .....*	5, 7, 10	100
Eurospher C4	ES BU 1 .....*	7	100
Eurospher C1	ES TM 1 .....*	7	100
Eurospher CN	ES CN 1 .....*	7	100
Eurospher NH <sub>2</sub>	ES NH 1 .....*	7	100
Eurospher Diol	ES OH 1 .....*	7	100
Eurospher Si	ES NP 1 .....*	3, 5, 7, 10	100
Eurospher Bioselect C18	ES OD 2 .....*	7, 10	300
Eurospher Bioselect C8	ES OC 2 .....*	5, 7, 10	300

**Hypersil®** - Thermo Quest (Runcorn, UK) Stationary phases featuring high mechanical stability and reproducibility.

Packing material	Order no.	Particle size (µm)	Pore size (Å)
Hypersil ODS	HS OD 1 .....*	3, 5, 10	120
Hypersil MOS	HS OC 1 .....*	3, 5, 10	120
Hypersil SAS	HS SA 1 .....*	3, 5, 10	120
Hypersil Phenyl	HS PH 1 .....*	3, 5, 10	120
Hypersil CPS	HS CN 1 .....*	3, 5, 10	120
Hypersil APS (NH <sub>2</sub> )	HS NH 1 .....*	3, 5, 10	120
Hypersil APS 2 (NH <sub>2</sub> )	HS NH 2 .....*	3, 5, 10	120
Hypersil Si	HS NP 1 .....*	3, 5, 10	120, 300
Hypersil Octyl-WP	HS OC 1 .....*	5, 10	300

\* Please add abbreviation (see pages 160 and 161) for particle size, pore diameter, column hardware type and column dimensions.

# Packing Materials

**Hypersil®** - Thermo Quest (Runcorn, UK) Stationary phases featuring high mechanical stability and reproducibility.

Packing material	Order no.	Particle size (µm)	Pore size (Å)
Hypersil Butyl-WP	HS BU 1 ..... *	5, 10	300
Hypersil BDS C18	HS OD 2 ..... *	3, 5	130
Hypersil BDS C8	HS OC 2 ..... *	3, 5	130
Hypersil BDS Phenyl	HS PH 2 ..... *	3, 5	130
Hypersil BDS CN	HS CN 2 ..... *	3, 5	130

**Inertsil®** - GL-Science (Tokyo, J) Packing materials with high chemical stability

Packing material	Order no.	Particle size (µm)	Pore size (Å)
Inertsil ODS 80	IS OD 1 ..... *	5	80
Inertsil ODS	IS OD 1 ..... *	5, 10	100
Inertsil ODS-2	IS OD 2 ..... *	5	150
Inertsil ODS-3	IS OD 3 ..... *	3, 5	100
Inertsil C8	IS OC 1 ..... *	5	150
Inertsil C8-3	IS OC 3 ..... *	3, 5	150
Inertsil C4	IS BU 1 ..... *	5	150
Inertsil Phenyl	IS PH 1 ..... *	5	150
Inertsil Phenyl-3	IS PH 3 ..... *	3, 5	150
Inertsil CN-3	IS CN 3 ..... *	5	150

**Kromasil<sup>T</sup> M** - Eka Nobel (Göteborg, S)

Packing materials which guarantee high resolution, reproducibility and stability.

Packing material	Order no.	Particle size (µm)	Pore size (Å)
Kromasil C18	KS OD 1 ..... *	3.5, 5, 10	100
Kromasil C8	KS OC 1 ..... *	3.5, 5, 10	100
Kromasil C4	KS BU 1 ..... *	3.5, 5, 10	100
Kromasil C1	KS TM 1 ..... *	3.5, 5, 10	100
Kromasil NH <sub>2</sub>	KS NH 1 ..... *	3.5, 5, 10	100
Kromasil Si	KS NP 1 ..... *	3.5, 5, 10	100
Kromasil CHI-I	KS CH 1 ..... *	5	100
Kromasil CHI-II	KS CH 2 ..... *	5	100

**LiChrosorb® - LiChrospher® - Superspher® - Purospher®** - Merck (Darmstadt, FRG)

We pack these tried and tested phases from the worldwide renowned manufacturer of adsorbents not only in our **NovoGROM** hardware, but also in other brands of HPLC columns such as Manufit, LiChrocart-system, etc.

Packing material	Order no.	Particle size (µm)	Pore size (Å)
LiChrosorb RP 18	MS OD 1 ..... *	5, 7, 10	100
LiChrosorb RP 8	MS OC 1 ..... *	5, 7, 10	100
LiChrosorb RP SelectB	MS OC 6 ..... *	5, 10	60
LiChrosorb RP 2	MS DM1 ..... *	7	60
LiChrosorb Nitrile	MS CN 1 ..... *	5, 7, 10	100
LiChrosorb Amino	MS NH 1 ..... *	5, 7, 10	100
LiChrosorb Diol	MS OH 1 ..... *	5, 7, 10	100
LiChrosorb Si	MS NP 1 ..... *	5, 7, 10	60, 100
LiChrospher RP-18	MS OD 2 ..... *	5, 10	100, 300
LiChrospher RP-18 endc.	MS OD 4 ..... *	5, 10	100
LiChrospher RP-8	MS OC 2 ..... *	5, 10	100
LiChrospher RP-8 endc.	MS OC 4 ..... *	5, 10	100
LiChrospher 60 RP select B	MS OC 7 ..... *	5, 10	60
LiChrospher Nitrile	MS CN 2 ..... *	5, 10	100
LiChrospher Amino	MS NH 2 ..... *	5, 10	100
LiChrospher Diol	MS OH 2 ..... *	5, 10	100, 300
LiChrospher Si	MS NP 2 ..... *	5, 10	60, 100, 300, 1000
Superspher C18	MS OD 3 ..... *	4	100
Superspher C18 endcapped	MS OD 5 ..... *	4	100
Superspher C8	MS OC 3 ..... *	4	60

\* Please add abbreviation (see pages 160 and 161) for particle size, pore diameter, column hardware type and column dimensions.

# Packing Materials

**Merck** (Darmstadt,FRG)

Packing material	Order no.	Particle size (µm)	Pore size (Å)
Superspher C8 endcapped	MS OC 5 ..... *	4	60
Superspher Silica	MS NP 3 ..... *	4	60
Purospher C18	MS OD P ..... *	5	100
Purospher C18 endcapped	MS OD E ..... *	5	100

**Nucleosil**<sup>®</sup> - Macherey & Nagel (Düren, FRG)

One of the widest ranges of HPLC-phases. Supported by extensive application information

Packing material	Order no.	Particle size (µm)	Pore size (Å)
Nucleosil C18	NS OD 1 ..... *	3, 5, 7, 10	50, 100, 120, 300, 500, 1 000
Nucleosil C18 AB	NS OD 0 ..... *	5	100
Nucleosil C18 HD	NS OD 3 ..... *	3, 5	100
Nucleosil C8	NS OC 1 ..... *	3, 5, 7, 10	100, 120, 300, 500
Nucleosil C8 HD	NS OC 3 ..... *	5	100
Nucleosil Protect-1	NS OC 4 ..... *	5	100
Nucleosil Phenyl	NS PH 1 ..... *	5, 7	100, 120, 300, 500, 1 000
Nucleosil C4	NS BU 1 ..... *	5	120, 300, 500, 1 000, 4 000
Nucleosil C2	NS DM 1 ..... *	7	100
Nucleosil CN	NS CN 1 ..... *	5, 7, 10	100, 120, 300, 500
Nucleosil N(CH <sub>3</sub> ) <sub>2</sub>	NS NH 3 ..... *	5, 10	100
Nucleosil NO <sub>2</sub>	NS NO 1 ..... *	5, 10	100
Nucleosil NH <sub>2</sub>	NS NH 1 ..... *	5, 7, 10	100, 120
Nucleosil Diol	NS OH 1 ..... *	5, 7	100, 120, 300, 1 000, 4 000
Nucleosil Silica	NS NP 1 ..... *	3, 5, 7, 10	50, 100, 120
Nucleosil SA	NS SC 1 ..... *	5, 10	100
Nucleosil SB	NS SA 1 ..... *	5, 10	100

**Partisil**<sup>®</sup> - Whatman (Clifton, NJ, USA)-

These phases are available for special applications.

Packing material	Order no.	Particle size (µm)	Pore size (Å)
Partisil ODS 3 (10,5%)	PS OD 3 ..... *	5, 10	90
Partisil ODS 2 (15%)	PS OD 2 ..... *	10	90
Partisil ODS (5%)	PS OD 1 ..... *	10	90
Partisil C8	PS OC 1 ..... *	5, 10	90
Partisil PAC	PS AC 1 ..... *	5, 10	90
Partisil SAX	PS SA 1 ..... *	10	90
Partisil SCX	PS SC 1 ..... *	10	90
Partisil Silica	PS NP 1 ..... *	5, 10	90

**PRP**<sup>®</sup> - Hamilton (Reno, NV, USA)

Polymeric phases with excellent separation characteristics and stability; particularly suited for ion chromatography.

Packing material	Order no.	Particle size (µm)	Pore size (Å)
PRP-1	RP OD 1 ..... *	5, 7, 10	75
PRP-3	RP OD 3 ..... *	10	300
PRP- <sup>∞</sup>	RP OD 1 ..... *		4
PRP-X100	RP SA 1 ..... *	10	
PRP-X200	RP SC 2 ..... *	10	
RCX-10	RP RC X ..... *	7	

**Spherisorb**<sup>®</sup> - Waters - (Milford, MA, USA)-

Versatile phases with exceptional high resolution.

Packing material	Order no.	Particle size (µm)	Pore size (Å)
Spherisorb ODS 2	SS OD 2 ..... *	3, 5, 10	80
Spherisorb ODS 1	SS OD 1 ..... *	3, 5, 10	80, 300
Spherisorb C8	SS OC 2 ..... *	3, 5, 10	80
Spherisorb C6	SS HE 1 ..... *	3, 5, 10	80, 300
Spherisorb Phenyl	SS PH 1 ..... *	3, 5, 10	80

\* Please add abbreviation (see pages 160 and 161) for particle size, pore diameter, column hardware type and column dimensions.

# Packing Materials

**Spherisorb®** - Waters - (Milford, MA, USA)-

Packing material	Order no.	Particle size (µm)	Pore size (Å)
Spherisorb C <sub>3</sub> WP	SS PR 1 ..... *	5, 10	300
Spherisorb C1	SS TM 1 ..... *	3, 5, 10	80, 300
Spherisorb CN	SS CN 1 ..... *	3, 5, 10	80
Spherisorb NH <sub>2</sub>	SS NH 1 ..... *	3, 5, 10	80
Spherisorb SAX	SS SA 1 ..... *	5, 10	80
Spherisorb SCX	SS SC 1 ..... *	5, 10	80
Spherisorb Silica	SS NP 1 ..... *	3, 5, 10	80, 300

**Synchropak®** - MICRA Scientific (Northbrook, IL, USA)

The outstanding HPLC phase from the USA

Packing material	Order no.	Particle size (µm)	Pore size (Å)
Synchropak C18	LS OD 1 ..... *	5, 6, 7, 10	100, 300, 1 000, 4 000
Synchropak C8	LS OC 1 ..... *	6, 7	300, 1 000
Synchropak C4	LS BU 1 ..... *	6, 7, 10	300, 1 000, 4 000
Synchropak HIC-Propyl	LS HI 3 ..... *	6	300
Synchropak Q	LS SA 1 ..... *	6	300
Synchropak CM	LS WC 1 ..... *	5, 6	100, 300
Synchropak S	LS SC 1 ..... *	6, 7	300, 1 000
Synchropak AX	LS WA 1 ..... *	5, 6, 7	100, 300, 1 000

**Vydac®** - Vydac (Hesperia, CA, USA)

Besides the standard materials, the "wide-pore" phases show excellent properties for the separation of biopolymers.

Packing material	Order no.	Particle size (µm)	Pore size (Å)
Vydac C18	VS OD 1 ..... *	5, 10	90, 300
Vydac C8	VS OC 1 ..... *	5, 10	300
Vydac C4	VS BU 1 ..... *	5, 10	300
Vydac Diphenyl	VS PH 2 ..... *	5, 10	300
Vydac Si	VS NP 1 ..... *	5, 10	90, 300

**Zorbax®** - Agilent Technologies (DuPont, resp. Rockland Techn. Inc. / Rockland, DE, USA)

These phases have been renowned for high quality since the introduction of HPLC.

Packing material	Order no.	Particle size (µm)	Pore size (Å)
Zorbax ODS	ZS OD 1 ..... *	5	80
Zorbax C8	ZS OC 1 ..... *	5	80
Zorbax Phenyl	ZS PH 1 ..... *	5	80
Zorbax TMS	ZS TM 1 ..... *	5	80
Zorbax Si	ZS NP 1 ..... *	5	80
Zorbax SCX	ZS SC 1 ..... *	7	300
Zorbax NH <sub>2</sub>	ZS NH 1 ..... *	5	80
Zorbax CN	ZS CN 1 ..... *	5	80
Zorbax SAX	ZS SA 1 ..... *	5	80

\* Please add abbreviation (see pages 160 and 161) for particle size, pore diameter, column hardware type and column dimensions.

**In addition, GROM also distributes the following prepacked Columns:**

**Zorbax** (Agilent Technologies):

Rx, SB, EclipseXDB, Bonus RP, Extend, Bio Series, Ultron ES-OVM

**Vydac**

201TP, 208TP, 214TP, 218TP, 228TP, 201/208HS, 259VHP, 238TP, -401TP

**Chrom Tech AB**

AGP, CBH, HSA

**TosoHaas**

All TosoHaas products are available from **GROM**. We will be pleased to send you a catalogue upon request.

**YMC**

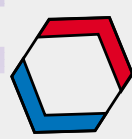
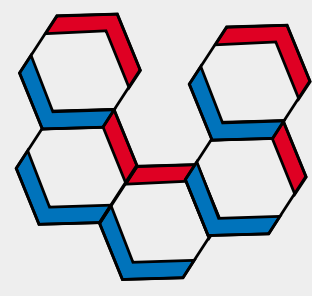
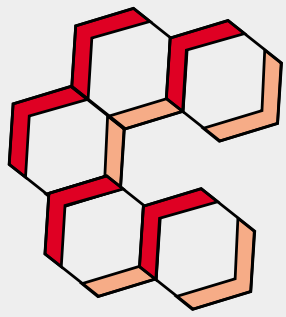
These phases are available in **NovoGROM** hardware. Please inquire for the catalogue.

# Chiral-AGP, Chiral-CBH and Chiral HSA

Prepacked chiral columns from

**CHROM TECH AB** (Norsborg, Sweden)

Order number	Chiral packing material	Dimension
AGP 150.18	Chiral-AGP	150 x 0.18 mm
AGP 100.2	Chiral-AGP	100 x 2 mm
AGP 150.2	Chiral-AGP	150 x 2 mm
AGP 50.4	Chiral-AGP	50 x 4 mm
AGP 100.4	Chiral-AGP	100 x 4 mm
AGP 150.4	Chiral-AGP	150 x 4 mm
AGP 100.10	Chiral-AGP	100 x 10 mm
AGP 150.10	Chiral-AGP	150 x 10 mm
AGP 10.3	Chiral-AGP-guard column	10 x 3 mm
AGP 10.2	Chiral-AGP-guard column	10 x 2 mm
CH 10.3	guard column holder	
CBH 100.2	Chiral-CBH	100 x 2 mm
CBH 150.2	Chiral-CBH	150 x 2 mm
CBH 50.4	Chiral-CBH	50 x 4 mm
CBH 100.4	Chiral-CBH	100 x 4 mm
CBH 150.4	Chiral-CBH	150 x 4 mm
CBH 100.10	Chiral-CBH	100 x 10 mm
CBH 150.10	Chiral-CBH	150 x 10 mm
CBH 10.3	Chiral-CBH-guard column	10 x 3 mm
CBH 10.2	Chiral-CBH-guard column	10 x 2 mm
HSA 100.2	Chiral HSA	100 x 2 mm
HSA 150.2	Chiral HSA	150 x 2 mm
HSA 100.4	Chiral HSA	100 x 4 mm
HSA 150.4	Chiral HSA	150 x 4 mm
HSA 100.10	Chiral HSA	100 x 10 mm
HSA 150.10	Chiral HSA	150 x 10 mm



**A WAY TO  
CHIRAL SEPARATIONS**